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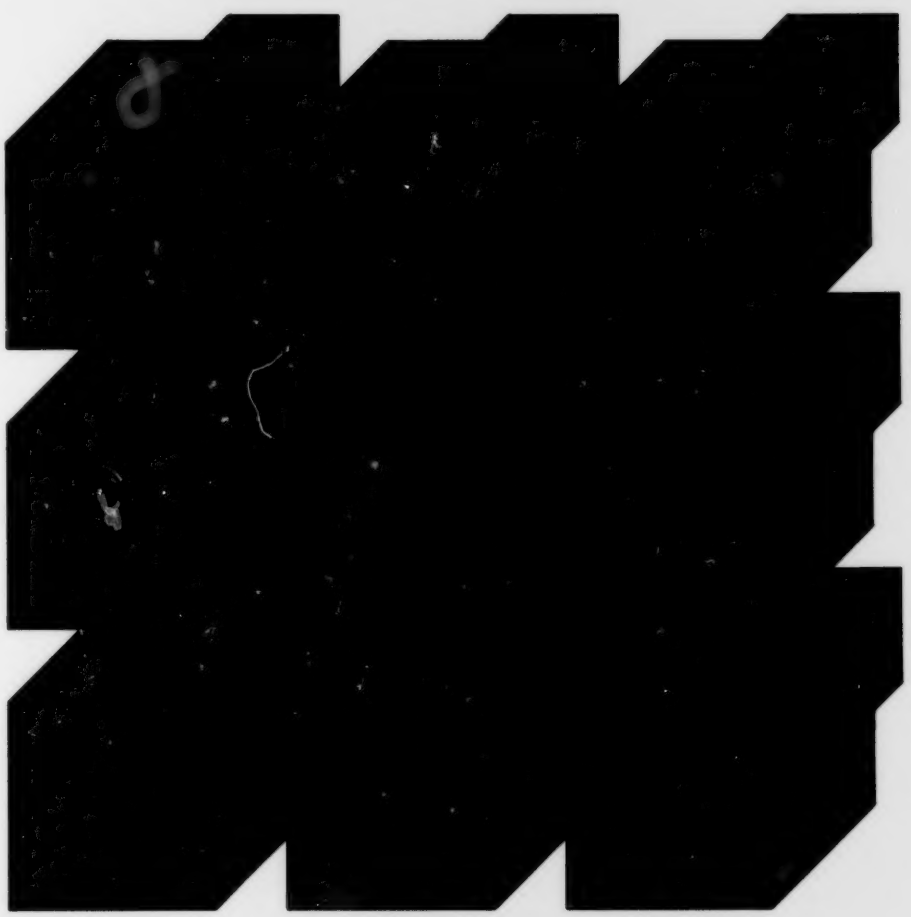

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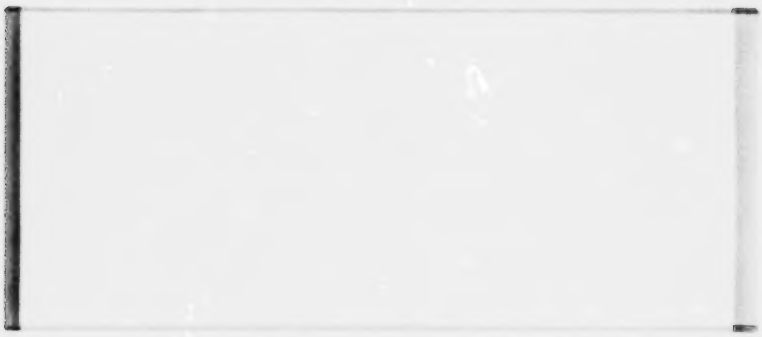

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DISCUSSION PAPER NO. 319

Assessment and Fiscal Treatment of Imputed Rents for Homeowner-Occupiers

by

Richard-Philippe Domingue

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RÉSUMÉ

Les autorités fiscales canadiennes ont toujours choisi de ne pas imposer les rentes imputées nettes perçues implicitement par les propriétaires occupants. On peut croire que cette décision est essentiellement motivée par un désir de simplicité administrative. Pourtant, la littérature traditionnelle prétend que ces subsides implicites, qui prennent la forme d'impôts évités, sont à la fois inéquitables et inefficaces.

Le premier objectif du présent document est d'analyser les méthodes permettant d'estimer les valeurs locatives potentielles des propriétés. Deux modes d'évaluation prévalent : la méthode du coût d'opportunité nul du propriétaire et la méthode de la valeur locative équivalente. Ces méthodes de calcul, utilisées respectivement par le Ministère des Finances Canada et par Statistique Canada, mènent à des estimations fort divergentes (pour l'année 1979, les Finances estiment les rentes imputées nettes à 18,5 milliards de dollars alors que Statistique Canada les évalue à -213,8 millions).

Le second objectif est d'examiner si l'imposition des rentes imputées accroît l'équité. On conclut que l'équité horizontale entre locataires et propriétaires s'accroît, mais qu'une équité verticale grandie entre propriétaires n'est pas assurée si on accepte qu'il n'est pas socialement désirable de voir le fardeau fiscal additionnel s'abattre, en partie, chez les personnes âgées propriétaires à faibles revenus.

Finalement, le troisième objectif est d'analyser l'impact sur le bien-être économique, d'une part de la non-imposition des rentes imputées nettes (dans un cadre d'équilibre partiel), et d'autre part de leur taxation (dans une perspective d'équilibre général simulée à l'aide du modèle Ballentine-Thirsk). L'équilibre partiel montre comment la perte de bien-être est liée au carré du taux marginal d'imposition. Ainsi, à l'aide des estimations de Statistique Canada pour les années 1980 à 1983, on évalue les distorsions créées par la non-imposition des rentes nettes à respectivement 0 $, 23,99 $, 1 238,99 $ et 4 476,81 $ par propriétés auto-occupées. L'analyse en équilibre général permet de voir que l'imposition des loyers implicites, dans le seul but d'accroître les recettes fiscales, introduit une distorsion supplémentaire dans l'économie. Cette distorsion possède un effet dépressif sur la demande globale. De plus, le modèle calculable montre qu'élargir la base imposable des revenus des particuliers, en y incluant les rentes implicites tout en maintenant l'objectif de recettes fiscales fixes, rend l'économie imperceptiblement plus efficace. Les gains associés à l'imposition des rentes imputées sont, en effet, relativement négligeables.

ABSTRACT

In Canada, the net imputed rental income that homeowner-occupiers implicitly receive has traditionally not been taxed by governments. It may be that the main motivation for this decision is a desire for administrative simplicity. Standard economic theory, however, holds that these implicit subsidies in the form of foregone tax revenues are both inequitable and inefficient.

The first objective of this paper is to analyze the methods used to estimate the potential rental value of properties. There are currently two estimation methods: the user cost approach, used by Finance Canada, and the market rent equivalence approach, used by Statistics Canada. These two methods, however, have produced highly divergent estimates (for 1979, Finance Canada estimated net imputed rents at $18.5 billion, while Statistics Canada's figure was -$213.8 million).

The second objective is to determine whether taxing imputed rents would result in increased equity. It is concluded that horizontal equity between renters and owners would increase, but that it is not clear whether greater vertical equity between homeowners would result, assuming that it is not the wish of society to see an additional fiscal burden imposed on elderly low-income homeowners, among others.

Finally, the third objective is to analyze the impact on economic welfare when net imputed rents are not taxed (using a partial equilibrium framework) and when these rents are taxed (using a general equilibrium approach based on the Ballentine-Thirsk model). The partial equilibrium method demonstrates that welfare losses vary with the square of the marginal tax rate. Using Statistics Canada estimates for the years 1980 to 1983, the distortions created by not taxing net rents are then estimated at $0, $23.99, $1,238.99 and $4,476.81 per owner-occupied property in those years, respectively. The general equilibrium analysis indicates that by taxing implicit rents with the sole purpose of increasing tax revenues, additional distortion would be introduced into the economy. This distortion would tend to depress overall demand. In addition, calculations using the model show that if the individual income tax base is expanded to include implicit rents while the objective of steady tax revenues is maintained, the efficiency gains for the economy are imperceptible. Thus the advantages of taxing imputed rents appear to be relatively insignificant.

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Thank you finally to all Council employees far and wide who contributed to this paper; without them this project could not have been a success. A special thank you to my sister Jocelyne who always took time to help me.

Ottawa, September 1986

FOREWORD

This paper is one of the outputs from Council's three year study of the taxation of capital income -- or of the income derived from savings and investment. The study program had important dimensions in both time and space. The effects of capital taxation on both present and future output and standards of living were scrutinized. Taxes levied by all levels of Canadian government were studied as were the international implications of the taxation of capital income. Another important emphasis in the study program was on the interrelationship among specific measures of capital taxation. Here, general equilibrium and other techniques were used to examine the various measures as an interrelated system. Separate studies were also undertaken of specific measures of capital taxation including the personal and corporate income taxes, sales and transaction taxes, property taxes, and resource taxes.

This paper is one of the separate studies of the tax treatment of owner-occupied housing. The returns from this housing are about the only ones automatically exempt from income tax. Questions about the efficiency and equity of this exemption cannot be approached without first resolving a great uncertainty about the size of the exempt income. The author analyses the strengths and weaknesses of two methods commonly used to estimate the returns to owner-occupied housing. In addition, the author simulates the effects that an inclusion in taxable income of the returns from housing would have on the economy in general and on the distribution of income.

Richard-Philippe Domingue is currently a graduate student at Queen's University. This study was prepared while the author was at the Economic Council of Canada, in collaboration with Pierre Mercier and supervised by Sylvester Damus.

Judith Maxwell
Chairman

INTRODUCTION

There is no doubt that housing is a subject of great importance to most people. In 1978, homeowners and renters spent an average of 15.5 and 17.0 per cent of their family budgets, respectively, on housing.[1]

It is therefore not surprising that there are a great many government measures related to housing (direct subsidies, mortgage loans, tax expenditures, etc.). Two examples may serve to illustrate the extent of government intervention. In 1979 mortgage loans for new and existing housing granted by the Canada Mortgage and Housing Corporation totalled $4.266 billion;[2] this is an example of an explicit measure. Implicit measures, on the other hand, have a much lower profile and rarely surface in discussions. Their effects are significant, however. In 1979, for example, there were 13 different federal tax expenditures related to housing alone, ranging from the capital gains deduction on principal residences to sales tax reductions on mobile homes. These federal tax expenditures amounted to $6.89 billion.

It is paradoxically true that for some people housing accounts for a major part of expenses, while for others a home represents part of accumulated wealth. This difference in how housing is perceived is reinforced by a tax system that distinguishes people on the basis of what kind of accommodations they have.

This paper will examine the assessment of imputed rents arising from capital invested in owner-occupied residences, and the consequences of the tax expenditure of not taxing implicit rents. It is hoped that some of the deficiencies of previous articles on the subject can be rectified. Before turning to specifics, the first chapter will present a brief review of the theoretical and traditionally cited consequences of non-taxable imputed rents. The second chapter will discuss the various methods of estimating imputed rents and their respective shortcomings; the question of whether implicit net rents are always greater than zero will be critically examined, and, in passing, whether certain previously published articles are justified in assuming constant positive returns; and imputed rent figures supplied by government authorities will be examined. Chapter 3 will demonstrate that the partial welfare loss caused by failing to tax homeowners' imputed rents varies with the square of the marginal personal income tax rate and the size of net imputed rent. It will also be shown why the sign of net welfare variation cannot be determined when there are positive distortions in other markets with close ties to housing.

In contrast to Chapter 3, which is concerned with the potential impact on the Canadian tax system as it now stands, the last two chapters will attempt to predict the overall effect of including implicit rents in the income tax base. Chapter 4 will determine

whether taxing net imputed rent would increase vertical equity between homeowners by analyzing how the resulting additional tax burden would be distributed. The degree to which homeownership and net imputed rent are concentrated among senior citizens, low-income families and low-population towns will be examined. Finally, Chapter 5 will present a simulation of taxable implicit rents using the Ballentine-Thirsk general equilibrium model.

Notes

1 Statistics Canada (1982a), Table 9, p. 19.

2 CMHC (1985), Table 34, p. 27.

3 For more information on federal government tax expenditures, see Department of Finance (1979).

1 BACKGROUND

A person living in a home that he or she owns plays two roles: the role of consumer of the service provided by the dwelling, and that of the owner receiving an implicit rent. Much has been published about imputed homeowner rents in the last 25 years. The vast majority of authors agree:[1] net imputed rent from dwellings should be included in the taxable income of a homeowner-occupier, since this brings us closer to the Haig-Simons definition of income (whereby the sum of consumption and accumulated wealth equals personal income).[2]

The imputed rent from a dwelling occupied by its owner has been taxed by certain governments in the past, and was still taxable in some places as of 1977. For example,[3] imputed income was taxable in the State of Wisconsin between 1911 and 1917, in Australia until 1923, in France until 1964 and in the Netherlands until 1976. In 1977, imputed rent was still taxed by the Belgian, Italian, West German and Swedish governments, among others.

A particularly well-known case is Britain, where imputed rent was taxed from the beginning of the 19th century until 1963.

> Prior to World War I, tenancy was the dominant form of housing tenure and the Schedule A tax on owner-occupiers largely a matter for the affluent classes. The Schedule A assessment of rental value applied, however, to tenant and owner-occupied properties with renters having the right to

> deduct income tax at the standard rate from subsequent payment to the landlord. The taxation of imputed rent under British income tax, at least initially, has nothing to do with concerns about interpersonal equity between renters and owner-occupiers. The Schedule A valuation of rental income for tenant and owner-occupied properties, with collection at the source, i.e., from the occupier, was a technique of tax enforcement.[4]

Certain governments did not include it in the tax base because:

> ...taxes on this form of income have produced negligible amounts of revenue relative to the yield of personal income taxes in general and administration and enforcement of income taxes on imputed rental income have been and remain a matter of great vexation to the tax authorities.[5]

And, indeed, the administrative problems are formidable. "It is difficult to implement and sustain effective taxation of imputed rent without imagination, persistence and conviction on the part of the fiscal authorities."[6] Finally, political factors (i.e., voter opinion) have prompted fiscal authorities to avoid introducing or to discontinue this form of taxation.

1.1 Tax treatment of homeowners

Direct net income before taxes generated by an owner-occupied dwelling is made up of net imputed rent (i.e., potential gross income from renting the premises minus applicable operating expenses) plus capital gain. In formal terms, net imputed rent before taxes (RIN*) can be expressed as follows:

$$RIN^* = RIB - (d + tf)\,V - A \qquad (1.1)$$

where RIB = gross imputed rent

d = depreciation rate

tf = property taxes

V = market value of dwelling

A = miscellaneous expenses (heat, insurance, maintenance, indirect taxes, etc.)

Since a mortgage is needed to buy a house, the actual net imputed rent before taxes received by the owner is:

$$RIN = RIN^* - r_h H \qquad (1.2)$$

where r_h = mortgage rate

H = remaining mortgage balance.

This equation makes the reasonable assumption that net imputed return varies from one property to another according to interest payments.

Capital gain (G) is defined as real appreciation of the property on the real estate market.

Taking as an example a homeowner-occupier who sells his house in a given fiscal year, the net income after taxes generated by the dwelling (Y_L) is:

$$Y_L = (1 - tp)\ (RIN + G) \qquad (1.3)$$

where tp = marginal personal income tax rate

Since in Canada both owners' imputed rental income and capital gains on principal residences are not taxable when received, the amount of tax saved (i.e., the implicit subsidy [S]) is expressed as:

$$S = tp\ (RIN + G). \qquad (1.4)$$

Thus the degree of benefit varies directly with the marginal tax rate and the amount of net income generated by the premises.

Let us assume that rental property owners transfer to their tenants the taxes they pay on their rental income and that the current tax base is in effect: for a given dwelling, the amount of rent paid by tenants is higher than the imputed rent "paid" by owner-occupiers. However, if the tax system were to treat the owner-occupier as a owner renting the premises to himself, the subsidy will not exceed tp*G, and the net imputed rent which

the owner-occupier "pays" and is then taxed upon will be the same as the rent paid by tenants.[7]

1.2 Reduced efficiency

As was pointed out earlier, standard economic theory generally holds that the personal income tax base should include implicit rental income in order to satisfy the Haig-Simons equation.[8] When net imputed rents are not taxable, the personal income tax system contains distortions. The effect is to increase the number of owner-occupied homes, since the relative after-tax prices of such properties fall if their service value is not taxable. Consequently, the tax system encourages people to make home purchases rather than renting, leading to a less than optimal allocation of inputs.

> A study by the OECD found that the U.S. savings rate, while lower, is not far from international norms, if U.S. "housing savings" are included. But "savings" in the form of housing equity, unlike financing assets, are not available to be invested in industry. So tax favoritism for housing depresses productive capital formation.[9]

The result of combining a tax system that encourages ownership with greater homeowner stability (relative to renters)[10] is a reduction in people's geographic mobility. In addition, this type of tax base promotes a migration from city centres to suburbs as those wishing to purchase homes to live in are pushed out into peripheral areas.[11] This situation works to the advantage of

those individuals who, even without implicit subsidies, would have preferred to buy a house rather than to rent.

On the other hand, larger numbers of property owners may have positive outside effects, such as increased social stability, a greater sense of responsibility, and more community involvement.

1.3 Equity problems

The standard literature also claims that there are equity problems connected with an income tax system that excludes imputed rental income from owner-occupied homes. Thus for a given level of income (i.e., $Y_{rntr} = Y_{ownr} + RIN$), the homeowner's tax base is lower than that of the renter (since the owner pays tp*RIN less in taxes). So the two individuals, who enjoyed the same level of welfare before taxes (welfare here measured by income), have different after-tax welfare levels (a problem of horizontal equity between renters and homeowners).

Moreover, such a tax system is regressive, since a homeowner-occupier receives a larger subsidy if he is in an income bracket with high marginal tax rates (a problem of vertical equity between homeowners). If the amount of tax saved (E) is measured as a percentage of gross imputed rent, we get:

$$E = \frac{tp*RIN}{RIB} * 100$$

Thus there are two simultaneous effects: first, the homeowner enjoys a level of wealth that allows him to attain a high RIN/RIB ratio (for example, a mortgage-less house purchase), and, second, this high RIN enables him to escape the high tax rates associated with the high income that this wealth generates. Table 1-1 clearly shows the problem of vertical equity between homeowners. For example, let us assume two homeowners with an RIN/RIB ratio of 0.75. The first, who has a non-taxable income, receives an implicit subsidy of zero; the other, with whose income places him in the 50 per cent bracket; receives a subsidy equal to 37.50 per cent of his gross imputed rental income.

The vertical equity problem may not be as bad as indicated in the preceding paragraph, however, assuming that there is a negative correlation between the ratio of net equity to the market price of the house and the size of cash income. This hypothesis means that low incomes exhibit high RIN/RIB ratios, because the expenses involved in using the premises are generally low. Turning again to Table 1-1, it can be seen that the combination of a RIN/RIB ratio of 0.75 and a 10 per cent tax rate leads to a larger subsidy as a percentage of gross imputed rent than an RIN/RIB ratio of 0.125 taxed at 50 per cent.

Table 1-1

Size of Subsidy as a Percentage of Gross Imputed Rental Income

	Marginal and average tax rates			
RIN/RIB	0	0.10	0.30	0.50
0	0	0	0	0
1/8	0	1.25	3.75	6.25
1/4	0	2.50	7.50	12.50
1/2	0	5.00	15.00	25.00
3/4	0	7.50	22.50	37.50
7/8	0	8.75	26.25	43.75
1	0	10.00	30.00	50.00

Notes

1 See, for example, Goode (1960), Laidler (1967), Aaron (1970), White-White (1977), Fulton (1982) and Kuttner (1985).

2 It is generally agreed (see Kitchen [1977], pp. 484-485, among others) that imputed rental income from durable goods other than housing should not be taxable because of the serious problems involved in assessing these rents. However, total imputed rents rise as property values increase, since there is a strong correlation between homeownership and the level of durable good consumption. For example, in 1982 the owner of a property valued at between $75,001 and $90,000 spent 19.91 per cent more on household appliances (refrigerators, stoves, air conditioners, etc.) than the owner of a property valued at between $30,001 and $45,000 (Statistics Canada, Family expenditures in Canada 1982, magnetic tape).

Moreover, Goode (1960, p. 512) suggests that gross return on other durable goods is probably higher than for housing, since people are prepared to finance their acquisitions by means of loans at interest rates exceeding mortgage rates. This argument weakens, however, when these other durable goods are assumed to be absolute necessities.

3 Goode (1960), p. 504 and Merz (1977), p. 436.

4 Merz (1977). p. 436.

5 Idem, p. 435.

6 Idem, p. 438.

7 It is assumed that the accelerated depreciation deduction for rental property owners is not transferred to renters. For a discussion of this point, see Clayton (1974), pp. 302-303 and Aaron (1970), pp. 801-802.

8 As Hamilton-Whalley correctly point out (1985, p. 157), from a symmetrical point of view, imputed rental income should not be taxable.

> Evaluated relative to a pure consumption tax [SIC -- this should read "pure expenditure tax"] rather than a pure income tax, housing is appropriately treated if imputed income goes untaxed since the income stream to the asset is not further taxed once the asset has been purchased. The intertemporal misallocation problem arises not with housing, but from taxation of non-housing capital income.

9 Kuttner (1985).

10 If a non-mover is defined as one living as of the 1981 census in the same house as five years ago (and conversely for a mover), then in Canada male homeowners are more often non-movers than movers, except for Alberta, where the reverse is true. In 1981, 61.4 per cent of Canadian homeowners were considered to be non-movers, while 77.8 per cent of individuals occupying rental premises were defined as movers.

Some interesting points to consider: the high degree of mobility among renters (88.9 per cent) and homeowners (50.1 per cent) in Alberta; the low mobility of homeowners in the Atlantic region (30.3 per cent); and the low mobility of Quebec renters (70.8 per cent).

(Statistics Canada, 1981 Census - Households and Individuals, magnetic tape.)

11 For a discussion of the role played by the fiscal treatment of homeowners in suburban migration, see Sunley (1971).

2 MEASURING IMPUTED RENTS

As noted in the last chapter, one reason that tax authorities have generally avoided taxing implicitly received rental income is that it is difficult to estimate fairly. As will be seen in this chapter, assessments vary a great deal depending on the calculation method used.

Among currently available assessments are those of the Department of Finance, which publishes figures for tax expenditure arising from the non-taxation of imputed homeowner rents. The fact that these figures are published demonstrates that imputed rents can be measured. Statistics Canada publishes the estimated values of imputed rents as part of its National Accounts, as well as in its input-output tables. Real estate companies, for their part, also make available estimates of the potential rental value of properties.

In this chapter the methodologies proposed by various authors and the methods used by government organizations will be presented, and the figures so obtained will be briefly examined. An analysis of the calculation methods used by real estate companies appears in Appendix A.

2.1 Proposed calculation methods

Two approaches have generally been used to evaluate imputed rent: the null homeowner opportunity cost method (known as the User Cost Approach), whereby the net rent for a property is equal to the net income from substitute assets; and the equivalent rental value method (known as the Market Rent Equivalence Approach), based on the market value of the gross rent paid. These two approaches will be examined in turn.

2.1.1 User cost approach

This method of evaluating imputed rent assumes that there is a null opportunity cost for the homeowner when he, acting as an investor, decides to purchase a dwelling rather than any other kind of asset. In a competitive world, therefore, the net return on owning the property should be equal to the net income from a substitute asset of the same value.

The net real rate of return on one property unit (r_n) will thus be

$$r_n = \frac{RIN^* - r_h H(1-P) + G}{V} - \frac{}{} \qquad (2.1)$$

where $r_h HP$ = depreciation in the real value of the mortgage as a result of inflation (P).

Clearly, in a restrictive case where there are no real capital gains or inflation, it will be found that:

$$RIN^* = r_n V + r_h H. \tag{2.2}$$

Using Equation 1.2, we find that:

$$RIN = r_n V. \tag{2.3}$$

Similarly, it can be shown that:

$$RIB = r_b V. \tag{2.4}$$

where r_b = the gross real rate of return on one property unit (assuming no capital gains or inflation).

Various authors have tried to estimate the return on the market value of a dwelling in terms of the gross and net imputed rent which, when added to real capital gains, would yield a null opportunity cost. They were hoping in this way to find the nominal implicit rates of return, both net (r_n^*) and gross (r_b^*), associated with the market value of the property, as a direct way of finding:

$$RIN = (r_n^*)V. \tag{2.5}$$

$$RIB = (r_b^*)V. \qquad (2.6)$$

Other researchers have proposed using net equity value (E) instead of market value to compute the implicit return of a dwelling, i.e.:

$$RIN = (r_n^{**})E. \qquad (2.7)$$

Table 2-1 provides a partial list of nominal return (r_n^*, r_n^{**}, r_b^*) proposed by different authors.

2.1.1.1 Problems in evaluating imputed rent -- There are some serious problems with this method of assessment. First, transaction costs connected with a house purchase (such as legal and brokerage fees) are ignored; these have been estimated to make up 5-10 per cent of the price of a house.[1] These costs may cut into the return on a dwelling compared to the return on a substitute asset. Consequently, this assessment method overestimates the return on a dwelling.

Second, and even more importantly, it is not so easy to evaluate adjusted rates of return. These rates must be long-term. Looking again at Table 2-1, the wide range of proposed returns is a good indication of how difficult it is to make an accurate assessment. In addition, this assessment becomes a dubious exercise when one

Table 2-1

Nominal Rates of Return (Net and Gross) as Proposed by Various Authors

	Canada		United States			
	Kitchen[1]	Clayton[2]	Laidler[3]	Aaron[4]		White-White[5]
Gross imputed rent from occupied dwelling (r_b*, r_b**)	10.00	10.30	11.00	10.00	12.00	11.00
Depreciation			2.25			
Maintenance		1.10	1.25			
Interest payments		1.60				
Property taxes		1.60	1.50			
Net imputed rent from occupied dwelling (r_n*, r_n**)	1.00-1.50	6.00	6.00	4.00	6.00	

1 Kitchen (1967), pp. 489-490 (figures for the years 1961-1966 expressed as a percentage of dwelling's market value).

2 Clayton (1974), p. 301 (1969 figure expressed as a percentage of dwelling's market value).

3 Laidler (1969), p. 51 (1960 figure expressed as a percentage of dwelling's market value).

4 Aaron (1970), p. 805 (1966 figure expressed as a percentage of net equity).

5 White-White (1977), p. 122 (1970 figure expressed as a percentage of dwelling's market value).

realizes that returns vary from one dwelling to another. The gross nominal rates of return given in Table 2-2 are convincing evidence of this. These rates of return are calculated from the estimated market and rental values for six specific types of urban dwellings and published by Royal Trust (Royal-Lepage). These rates must be used with care, because:

> ...landlords do not increase their rents as soon as the market value of a dwelling rises, either because tenants are on leases which have not expired or because landlords are not immediately aware of the rising market value.[2]

The variation in gross rates of return from one province to another can be explained by the fact that "market rent will reflect any landlord tax advantages and the extent to which the local market competition forces those to be passed to tenants."[3] Moreover, since "maintenance and depreciation expenses are related to the value and age of the house and to the income of the owner,"[4] net rates of return can vary widely. In other words, r_b^* and r_n^* should not be seen as constants that can be uniformly applied to all dwellings, but as figures that should be assessed case by case on the basis of the real estate market. This greatly increases the difficulties involved in using this method for taxation purposes.

Table 2-2

Gross Rental Value as Percentage of Dwelling's Market Value, by Province, by Type of Construction, as of October 1, 1982[1]

Monthly rental value	Maritimes	Quebec	Ontario	Manitoba Saskatchewan	Alberta	British Columbia	Canada
Detached bungalow	0.0091199	0.0102859	0.0088222	0.0074213	0.0080723	0.007106	0.0084713
Detached two storey	0.00747	0.0104798	0.0075588	0.006851	0.0069902	0.0066025	0.0076587
Standard condominium townhouse	0.0094284	0.0092736	0.010913	0.0095781	0.0089235	0.0084219	0.0094231
Luxury condominium townhouse	0.008308	0.0092045	0.0087364	0.0097661	0.0068593	0.0071124	0.0083311
Standard condominium apartment	0.0108434	0.0087834	0.0110515	0.0107026	0.0088637	0.0082535	0.0097497
Luxury condominium apartment	0.01054	0.0106175	0.008937	0.0095238	0.0072064	0.0067581	0.0089328
Monthly average, provincial and national	0.0092849	0.0097743	0.0093365	0.0089737	0.0078192	0.0073757	0.0087607
Yearly average, provincial and national	0.1114188	0.1172916	0.112038	0.1076868	0.0938304	0.0885084	0.1051288

1 Royal Trust (1982), pp. 167-168 and 233-254. The definitions and details of the method used to calculate these figures for the table are given in Appendix A. The sum of columns may not yield the same monthly and yearly averages because of rounding.

2.1.1.2 Implicit return

> The average rate of return on equity [previously defined here as r_n^{**}] of 5.13 per cent appears low in comparison with the rate of return on other assets in 1971.... During 1971, the average conventional new mortgage rate was 9.4 per cent while the yield on corporate bonds was about 8.5 per cent. A fairly large discrepancy seems to exist between the return to homeownership and the return on other investments.... Some of the discrepancy can be rationalized by the tax exempt status of net imputed rental income. Still more of the discrepancy may be accounted for by such factors as special intangible benefits of pride and status which devolve upon homeowners. The remainder must be accounted for by expected capital gains on owner occupied housing caused by the relatively rapid rate of increase of house prices.[5] There is, however, no reason why housing should yield a comparable return...housing is a very secure investment.... The point that we are making is that the target rate of return is a social decision.[6]

Serious doubt is raised here about the user cost approach (and consequently about all articles using this assessment method). But this argument can be taken a step further:

> It is probable that only an infinitely small number of people in Canada are really aware of the existence of imputed rent. In fact, most seem to look upon home ownership as an expense rather than an investment from which they can obtain a positive return.[7]

In fact, there are questions as to whether net imputed rents are always greater than zero. As will be seen later, some estimates include negative values. When imputed rental income is lower than zero, homeownership can be explained as providing people with a sense of satisfaction that cannot be measured in monetary terms but which has a definite psychological value.

2.1.2 Market rent equivalence approach

It was noted earlier that taxing imputed rental income from durable goods other than dwellings is not feasible because of evaluation difficulties. Indeed, the rental market for such durable goods is small and so cannot serve as a point of reference for assessing rents.

In the case of dwellings, the rental housing market is well developed. The market rent equivalence approach estimates the owner-occupier's gross imputed rental income by making adjustments to the gross rent paid on the market by renters. Net imputed rent is derived by subtracting house operating expenses from gross imputed rent. Thus net imputed rent before taxes works out to:

$$RIN = RIB - (I + D + T + A) \tag{2.8}$$

where RIB = gross imputed rent based on the rental market

I = mortgage interest payments

D = depreciation

T = property taxes

A = allowable expenses (insurance, maintenance, energy, etc.)

2.1.2.1 Problems in assessing rent -- There are a number of objections that can be raised in connection with this method of assessing rents.

On the most basic level, it is questionable whether homeowners and renters are sufficiently alike that imputed rents can be calculated from the rent actually paid by renters. First, renters and homeowners do ascribe the same monetary value to the characteristics of a dwelling. However, the homeowner (because, for example, he may feel proud of the property or may want to feel more secure from eviction notices) has also purchased property rights in addition to the dwelling's bundle of characteristics. Thus homeowners and renters will put a different price tag on the same dwelling. Second, as has been discussed earlier, owner-occupiers and rental property owners are not treated the same under tax laws, the latter being taxed on net rent received. It is probable that rental property owners transfer their tax burdens to their tenants by raising the rent. In such circumstances, (before-tax) imputed rent will be overestimated if it is based on the rent the owner asks for an identical rental unit.

Even if the objections raised in the last paragraph are countered by assuming that ownership rights have a low monetary value and that the rental market is competitive enough to force owners not to pass on the tax burden, there are still problems

involved with calculating the variables used to derive imputed rent. King (1980) and Rosen (1979) both proposed using Equation 2.8, but did not discuss how to calculate its constituent variables.

Fulton (1980, Chapter IV) suggests using a hedonist method to calculate the potential gross rental value of a dwelling. While this approach may solve the problem of assessing gross imputed rent, it does not make quantifying expenses any easier. Arriving at a fair assessment of house operating expenses (i.e., the expenses included in gross imputed rent) in order to arrive at net imputed rent is not an easy task. Some expenses, such as mortgage interest payments and property taxes, are easily quantified, but factors such as depreciation and allowable expenses are not. (Questions arise such as: What should be the depreciation rate? What distinguishes repairs from renovations? How much of house insurance is for the contents and how much for the structure? etc.).

2.1.3 Comparison of the two methods

In conclusion, it is easy to see that both methods have their shortcomings. The basis of the market rent equivalence approach is the assumption that renters and homeowners attach the same value to housing. Precise evaluations of the potential rental

value of an occupied home and allowable expenses are required. Using this method would also mean setting up a virtual army of evaluators and a large tax department bureaucracy, and would require a high degree of cooperation between the various levels of government.

The user cost approach involves the difficult task of selecting an appropriate nominal net rate of return. It ignores transaction costs related to purchasing a dwelling and cannot be applied uniformly to all owner-occupiers because of the unpredictable relationship between the rental and market values of a dwelling.

It appears, however, that the user cost approach is preferable to the market rent equivalence approach. Under the latter evaluation method, net imputed rent can be reduced through deliberate action. For example, it encourages economic agents (particularly those in high tax brackets) to acquire better insurance policy and to make repairs in excess of what they would do under normal circumstances. The market rent equivalence approach does, however, have the advantage of discouraging employers from hiring black market workers, thereby cutting into the underground economy.

2.2 Current evaluation method

Despite the difficulties discussed above, government authorities continue to evaluate imputed rents. We will examine two methods, the first used by Statistics Canada and the second used by the Department of Finance. The particular weaknesses of each method will be noted, and the figures so obtained will be briefly examined.

2.2.1 Statistics Canada

This organization publishes, as part of the National Accounts (under expenditures and revenues), figures on imputed rents. On the revenue side, the value of net imputed rent is included in the aggregate value "Net income of non-farm unincorporated business, including rent."[8] On the expenditure side, the value of imputed rent appears in the categories "Gross imputed rent" and "Imputed rent residential rent and imputed residential capital consumption allowances."[9] In addition, Statistics Canada includes figures on the net imputed rents generated by dwellings in its input-output tables.[10] These last figures are derived from estimates released by the National Accounts Division.

2.2.1.1 Method used in national accounts[11] -- Statistics Canada uses the "market rent equivalency" approach described earlier.

The main feature of this method lies in the way it computes gross imputed rents from gross paid rent according to an equivalent space coefficient. This coefficient pays no attention to considerations such as quality, location of dwelling or lot size. This calculation method thus constitutes a hedonist approach, where the "space of rented premises" factor is the sole determinant of properties' potential rental values.

Table 2-3 summarizes the Statistics Canada method of evaluating gross and net rents (imputed and paid), and gives an example (based on 1984 data) of how the calculations are actually made.

2.2.1.2 Problems with the evaluation method -- In Section 2.1.2.1, the problems connected with assessing rent using the market rent equivalence approach were discussed. The problems faced by Statistics Canada in this regard are similar.

Objections can be made concerning how gross paid rent is converted into imputed rent. The method relies exclusively on space, and ignores all qualitative criteria. When calculating averages, two properties identical in terms of size, but distinct in terms of quality, will be considered to have the same rental value.

Table 2-3

Method Used in National Accounts to Calculate Imputed Rents

Methodology	Notes	1984 example (current $ millions)
Annual average gross contract rent paid	from monthly labour force survey (specifically, the related surveys: consumer price index -- rent component), FAMEX, census	$ 4,112.5
* number of rental units (thousands) [1]	from Census	*$ 3.3736
♦ 1000		
Total value of gross rent paid by renters, annually		$13,873.7
- expenses for equipment and services provided by landlords in connection with property use	i.e. cost of fuel, water, depreciation of of landlord-supplied electrical appliances, etc. from consumer price index -- rent component, FAMEX	-$ 2,052.8
Total value of gross rent paid by renters in terms of space, annually [2]	this figure is listed under "Gross paid rent" in the Personal Expenditure on Consumer Goods and Services table in the National Accounts	$11,820.9
* space factor (1.526)	each room in a owner-occupied dwelling is considered to be 1.526 times larger than one in a rented dwelling. figure derived from CMHC construction data on floorspace	* 1.526
* number of dwellings occupied by landlord (thousands) [3]	from Census	* 5,221.6
♦ [1]		▸ 3,373.6

Table 2-3 (cont)

Method Used in National Accounts to Calculate Imputed Rents

Methodology	Notes	1984 example (current $ millions)
Total value of renters' gross imputed rent, yearly [4]		$27,920.3
+ {(([2] + [4]) ÷ ([1] + [3])) * number of garages (thousands) ÷ 2}	yields rent for use of garage. It is assumed that half of the number of garages are owner-occupied. number of garages from FAMEX	{ + (4.62365 * 256.65) = } +$ 1,186.6
Total value of renters' gross imputed rents in terms of space (including garages), yearly [5]	this figure is listed under "Gross paid rent" in the Personal Expenditure on Consumer Goods and Services table in the National Accounts	$29,106.9
+[2]		+$11,820.9
+ Gross rent implicitly received for rented garages	i.e. additional optional rent for parking space from FAMEX	+$ 334.0
+ Gross rent implicitly received for garages made available to renters	i.e. garage rent included in dwelling rent	+$ 746.0
Total gross rent (imputed and paid)		$42,007.8
{- (repairs + taxes + insurance premiums + mortgage interest payments + depreciation + miscellaneous expenses))	{•} = estimated total expenses for dwelling space the source of these estimates is described in Statistics Canada (1975), p. 157.	{ - (4,398.0 + 7,920.4 + 913.9 + 15,238.2 + 5,643.4 + 1,904.5) = } -$36,021.6
Total net rent (imputed and paid)	this figure is included under "net income of non-farm unincorporated business, including rent" in National Revenue	$ 5,986.3
÷ adjustment factor		÷ 1.06

Table 2-3 (cont)

Method Used in National Accounts to Calculate Imputed Rents

Methodology	Notes	1974 example (current $ millions)
Adjusted total net rent (imputed and paid)		
Adjusted total net rent is then divided into total net paid rent and total net imputed rent according to the ratio between gross paid rent [2] and gross imputed rent [5]. In other words, the portion of expenditures connected with owner-occupied housing is distinguished from that connected with rental housing.	figures in braces are author's estimates	{ 1,634.07 (0.2893) + 4,013.33 (0.7107)}
Total net imputed rent and total net paid rent (both taken from the preceding operation) are disaggregated to find the shares of governments, incorporated businesses, exports, and individuals in this figure. Statistics Canada uses the following ratio: 75 per cent of imputed and paid rent is attributable to individuals, 25 per cent to the three other sectors.		

This method pays no attention to house location. Estimates of average paid rent may end up too low because partially subsidized rental housing is included (as in, for example, the case of a mining town where the dwellings are owned by the company). On the other hand, the fact that many urban dwellings are located in large downtown condominium complexes may cause average rent to be overestimated. Or these two factors may simply cancel each other out.

This calculation method also ignores the size of the lot. Housing lots in cities are generally smaller and more expensive than in the country, even for identical homes. In terms of units of service, the urban rent is greater.

The adjustment coefficient for dwelling space (i.e., the scalar multiplier) needs constant revision if accuracy is to be maintained. Lastly, Statistics Canada itself[12] recognizes that there is a problem with how the western provinces are weighted in the calculation of average gross rent paid in Canada. They appear to be weighted too heavily, causing paid rent to be calculated too high.

The conversion of total gross rent (imputed and paid) into total net rent (imputed and paid) is a difficult task, because it is not easy to assess the expenses involved. How much of an insurance

premium applies to the building itself and how much to personal possessions? As for maintenance, what distinguishes repairs from improvements? Since the assessment of mortgage interest is based on information from lenders, it is impossible to know the ultimate use of the funds (for example, a homeowner might take out a second mortgage on his home in order to buy a sailboat). Lastly, depreciation is based on replacement value, and so requires an intimate knowledge of price fluctuations within the real estate market.

There is clearly a problem when one wishes to divide total expenses into the share of rental unit space and owner-occupied space. Take, for example, the case of a landlord who lives in one of his own rental units. It is difficult to determine the share of mortgage interest, insurance premiums, depreciation and property taxes that applies to his residence and the share applicable to rental units.

Statistics Canada has chosen to divide expenses between rental housing and owner-occupied properties according to the ratio of gross paid rent to gross imputed rent. This method presents some difficulties, however, since it probably overestimates the share of maintenance expenses applicable to rental housing and underestimates that applicable to owner-occupied properties. It is possible that there is a greater incentive for landlords to

make repairs to the dwelling they live in (using better quality and more durable materials, which are more expensive) than to their rental properties.

The set rule for dividing net paid rent and net imputed rent among individuals, corporations, exports and governments might also be challenged.

2.2.1.3 Estimated rent -- It can be seen from Table 2-4 that there was a series of negative total rents between 1976 and 1979. It should be remembered that in the mid-1970s the effects of steeply rising prices were being felt in the real estate market. These years were also marked by relatively slow growth in gross paid rents and by a sharp rise in depreciation and property taxes (both of these factors related to rising prices); the end result was below-zero total rents. In the late 1970s, the effects of unprecedentedly high mortgage rates were being felt (in 1979, mortgage interest accounted for over 41 per cent of total expenses).

In the early 1980s, the paid rent growth rate was up and house prices had stabilized (meaning that depreciation and property taxes were also stable), so that the figures for total net rent were above zero and rising steadily (despite the fact that the interest payment component of total expenses was on the rise).

Table 2-4

Value of Net and Gross Rent (Paid and Imputed), Statistics Canada Estimates

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
					(current $ millions)					
Total gross rent (paid and imputed)	12,358.5	15,342.1	17,690.4	19,828.0	22,345.5	25,479.5	29,457.1	34,263.7	38,308.2	42,008.0
Total expenses	11,462.2	15,498.0	17,942.9	19,931.7	22,645.7	25,363.5	29,149.2	32,002.4	33,670.9	36,021.6
Repairs	2,033.0	2,261.5 (14.6)	2,475.0 (13.8)	2,689.7 (13.5)	2,981.7 (13.2)	3,314.3 (13.1)	3,786.5 (13.0)	3,934.3 (12.3)	4,068.5 (12.1)	4,398.0 (12.2)
Taxes	3,234.3	3,444.8 (22.2)	3,855.2 (21.5)	4,208.2 (21.1)	4,748.0 (21.0)	5,139.0 (20.3)	5,822.0 (20.0)	6,538.1 (20.4)	7,120.0 (21.1)	7,920.4 (22.0)
Insurance	369.2	399.6 (2.6)	465.0 (2.6)	473.6 (2.4)	504.5 (2.2)	568.1 (2.2)	648.8 (2.2)	793.9 (2.5)	849.3 (2.5)	913.9 (2.5)
Mortgage interest	3,752.8	5,855.4 (37.8)	7,063.0 (39.4)	7,999.8 (40.1)	9,309.0 (41.1)	10,816.4 (42.6)	12,532.0 (43.0)	13,968.5 (43.6)	14,598.8 (43.4)	15,238.2 (42.3)
Depreciation	2,072.9	2,686.7 (17.3)	3,123.7 (17.4)	3,510.4 (17.6)	3,930.5 (17.4)	4,389.1 (17.3)	5,003.5 (17.2)	5,235.0 (16.4)	5,275.9 (15.7)	5,643.4 (15.7)
Miscellaneous expenses		850.0 (5.5)	961.0 (5.4)	1,050.0 (5.3)	1,172.0 (5.2)	1,136.6 (4.5)	1,356.4 (4.7)	1,532.6 (4.8)	1,758.4 (5.2)	1,904.5 (5.3)
Total net rent	896.3	- 155.9	- 252.5	- 103.7	- 300.2	116.0	307.9	2,261.3	4,637.3	5,986.4
net imputed rent for owner-occupied dwellings		- 106.3	- 173.8	- 71.6	- 207.8	80.5	213.9	1,569.2	3,213.4	3,913.0
net imputed rent for owner-occupied garages		- 3.1	- 5.0	- 2.1	- 6.0	2.2	5.5	37.6	78.9	100.3
net rental income from rental properties		- 34.7	- 54.1	- 21.9	- 63.7	23.7	65.6	504.6	1,057.6	1,589.2
net rental income from rented garages		- 1.1	- 1.7	- 0.7	- 2.0	0.7	1.9	13.3	28.5	45.0
other rents		- 10.8	- 18.0	- 7.5	- 20.8	8.9	21.0	136.6	258.9	339.0

Notes Figures in parentheses refer to posted expenses as a percentage of total expenses. Because the method used to calculate expenses changed in 1976, figures for previous years are not compatible. Data for 1975 are shown to point out the change of sign. These figures are derived from unpublished Statistics Canada listings (1985a).

The disaggregation of 1984 total net rent into imputed rent and rental income was estimated by the author.

It should also be noted that net imputed rents for owner-occupied dwellings and net rental income from rental properties account for approximately 71 and 22 per cent of total net rent, respectively.

Table 2-5 lists the figures used by Statistics Canada for imputed rent in the National Accounts and input-output tables. The derivation of "gross imputed rent" was described in Table 2-3 in the discussion on the calculations. The figures for "net rents and imputed allowance for capital consumption" should be used with care. The capital consumption allowance included in the item is of doubtful accuracy because of the difficulties involved in dividing expenses between rental and owner-occupied properties. Statistics Canada claims to publish this aggregate value because it is required to do so, and does not feel that it merits serious attention.[13] The figure for "net imputed income of homeowner-occupiers" is based on data used in the National Accounts. It is worth noting how closely the figures for the years 1976-1979 match the figures given in Table 2-4.

2.2.2 Department of Finance

The Department of Finance publishes, as part of its tax expenditure reports, figures on foregone tax revenues as a result of owner-occupiers' imputed rental incomes being

Table 2-5

Imputed Rent as Estimated and Published by Statistics Canada

	1975	1976	1977	1978	1979	1980	1981	1982	1983
	(current $ millions)								
National accounts									
Gross imputed rent[1]	8,687	11,047	12,805	14,377	16,231	18,554	21,436	24,872	27,732
Net rent and allowance for capital consumption (i.e., imputed elements included in gross national expenditures)[2]	2,276	1,872	2,116	2,486	2,639	3,267	3,852	5,411	7,140
Input-Output Tables									
Net imputed income of homeowner-occupier[3]	901.1	10.4	-47.4	67.8	-49.2	180.5			

1 Statistics Canada (1984a), Table 53.

2 Statistics Canada (1984a), Table 55.

3 Statistics Canada (1984b).

non-taxable. The tax expenditure was calculated at $2.9 billion (current dollars) in 1976, $3.7 billion in 1979,[14] and 4.5 billion in 1981.[15] This assessment of foregone tax revenues implies an estimation of the imputed rents of homeowner-occupiers.

The method used to derive the 1979 figures is based on the "user cost" approach, and is summarized in Equation 2.7.[16] The average mortgage debt is subtracted from the value of dwellings owned and occupied by their owners; then, assuming that invested capital yields a net imputed return of 9.2 per cent (this rate of return -- r_n^{**} -- is equal to the average rate offered for 10-year government securities), total net imputed rent can be calculated. (Lastly, tax losses are calculated by applying a uniform marginal tax rate of 20 per cent.)

It was seen earlier that this evaluation method is both simple, in that it is not necessary to calculate the relative expenses of the properties involved, and complicated, because an appropriate adjusted rate of return must be chosen to be applied to net equity over the long term. This problem was implicitly recognized in 1981, since imputed rent was adjusted to 5 per cent of invested capital in that year.

Extrapolating the net imputed income figure for 1979 yields a figure of $18.5 billion.[18] This contrasts sharply with the

negative value given by Statistics Canada (see Table 2-4). This striking difference is due to the fact that the rate of return used to calculate the implicit return is based on the nominal rate offered by government securities. Finance Canada disregards real capital gains, since simply applying this rate of return to net equity results in a null opportunity cost. Thus, Finance Canada estimates consist of net imputed rent, added to the equity multiplied by the inflation rate.

The debate over such rents is now considered closed by Finance Canada, since the latest edition of the tax expenditure report no longer contains figures for tax losses attributable to the imputed rental income of homeowner-occupiers.

> The previous accounts took the position that the non-taxation of this imputed income constituted a deviation from neutrality, and hence a selective tax measure. However, such imputed income is universally viewed as not being a source of funds that should or could feasibly be subject to tax. Thus...for pragmatic purposes, the non-taxation of imputed rent is considered to be part of the benchmark tax structure and not a selective tax measure.[19]

Notes

1 Fulton (1980), p. 61. Department of Finance (1985b), p. 5.

2 Kitchen (1967), p. 488.

3 Fulton (1980), p. 23.

4 Idem, p. 23.

5 Idem, p. 61.

6 Atkinson-King (1980), p. 9.

7 Kitchen (1967), p. 484.

8 For an example, see Statistics Canada (1984a), Table 1.

9 See Statistics Canada (1984a), Tables 53 and 55.

10 See Statistics Canada (1984b), Tables 60, 69, 78 and 87.

11 Two sources were of particular help in the methodological description: Statistics Canada (1975), p. 154-157; and an interview on June 25, 1985 in Ottawa with Doug Clancy of Statistics Canada's National Accounts Division, at which time programs and tables were made available to us.

12 Interview with Doug Clancy.

13 Idem.

14 Department of Finance (1979), p. 48.

15 Department of Finance (1981), p. 6. The following table illustrates where the tax expenditure of $4.5 billion stands in relation to other revenues:

. taxable incomes without tax breaks (1981)	$189.0 billion
. incomes actually taxed	156.3
. erosion of tax base as a result of favouritism (see Idem, p. 2)	$ 32.7

16 Two sources were used here: Department of Finance (1979), p. 90; and an interview on June 28, 1985 with Brian Wurts of the Department of Finance, Ottawa.

17 Department of Finance (1981), p. 33.

18	Tax expenditure		$3.7 billion
	Marginal tax rate	÷	0.2
	Net imputed income		18.5
	Net return on equity	÷	0.092
	Net equity		201.09

19 Department of Finance (1985a), p. 20.

3 VARIATION IN WELFARE DUE TO NON-TAXABLE IMPUTED RENTS (PARTIAL EQUILIBRIUM)

Chapter 2 demonstrated that it is possible to estimate imputed rents (accuracy is another question). Using these estimates, we will now attempt to measure the social costs involved in failing to tax imputed rents generated by an owner-occupied home. It will be seen that the partial loss of welfare varies with the square of the marginal tax rate applied to other sources of income and with the amount of imputed rent. We will then examine the somewhat tenuous link between net variation in welfare and non-taxable imputed rents when positive distortions exist in other markets.

3.1 Assumptions

First, let us examine the assumptions we will be making in this chapter. This discussion will also give us an opportunity to look briefly at previous literature dealing with the economic loss caused by non-taxable imputed rents.

i) It is assumed that net imputed rent is greater than zero, that the implicit subsidy received by the owner is defined as $s = tp^*RIN$ and that total tax expenditures equal $S = \Sigma s$.

ii) The unit of housing service is defined as the quantity of service produced by one unit of housing stock.

iii) Units of housing service are disaggregated into two groups: the rental housing market and the homeowner market. This implies that the price of services may be different, and that the two services are not perfect substitutes. This approach, used by Aaron (1970) and Laidler (1969), has been the object of some criticism.[1] For example,

> ...it makes no difference to a consumer whether the housing consumed is owned or rented. There may be different financial implications to each form of tenure, but if the costs are alike the utility derived from consuming housing as an owner and as a renter is the same.[2]

While acknowledging the shortcomings of assuming heterogeneous services, we will retain the assumption for purposes of illustration. One reason for making this assumption, among others, is that there are differences in how homeownership is viewed, which means that the same property may not have the same value in the eyes of both owners and renters (see Section 2.1.2.1).

iv) The response of economic agents to housing depends on how sensitive supply and demand are to variations in the prices of service.

Aaron (1970) and Laidler's (1969) assumption that, in the long term, market supply is perfectly elastic to price is also made here. White-White (1977) give a good description of the origins of this assumption:

> R. Muth...argues that the supply of new housing is infinitely elastic in the long run. Muth bases his conclusion on data which show that the prices of building materials and the wages of construction workers do not rise and fall with the volume of housing construction. He also argues that the high turnover rate of firms in the building industry suggests that there are no barriers to entry and no shortage of entrepreneurial skills which might cause the cost of housing to rise in years of high output.[9]

However, White-White (1977) question the choice of a null slope for housing supply. They claim that even if Muth's reasoning is sound, there are still two inputs to the housing production process -- land and capital -- that are not subject to a perfectly elastic supply curve. Increasing the supply of urban land available for new residential construction inevitably results in higher prices for land located close to work centres, and this leads to increases, through the substitution effect, in the price of all undeveloped land in the immediate area. Moreover, they claim, increased supply of mortgage money always leads to higher interest rates, prompting people to invest more in savings and thereby directing the flow of loan money to this type of loan.

For these two inputs, the elasticity of housing supply lies between zero and infinity.

The line of argument in the preceding paragraph can be refuted, however. For one thing, even when owned by real estate development companies, it is not necessary for the price of land available for new construction to rise for development to take place.

> It is argued that the ownership of developable land is concentrated. Landowners withhold land, raising prices, raising new housing cost and causing a sub-optimal stock of housing. However, neither economic theory nor the facts support the conclusion that concentrated ownership has distorted resource allocation.[9]

As well, the mortgage loan market is flexible enough to absorb the additional demand for funds without significantly raising the rental price of money.[5] And this market is not considered here to be a dependent market that contracts in response to an expansion in the loan money supply, in all its various forms. Canada's lack of clout on international money markets means that it has little influence on interest rates.

Mayo (1981) provides a comprehensive list of price and income elasticities for rental and owner-occupied dwellings in the United States. According to the most accurate estimation methods surveyed, income elasticities vary from 0.3 to 0.5 for renters,

and from 0.5 to 0.7 for homeowners. Price elasticities, for renters as well as homeowners, range from -0.6 to -0.7. Our computations will be based on these estimates and will assume a linear demand curve.

3.2 Partial assessment of welfare loss

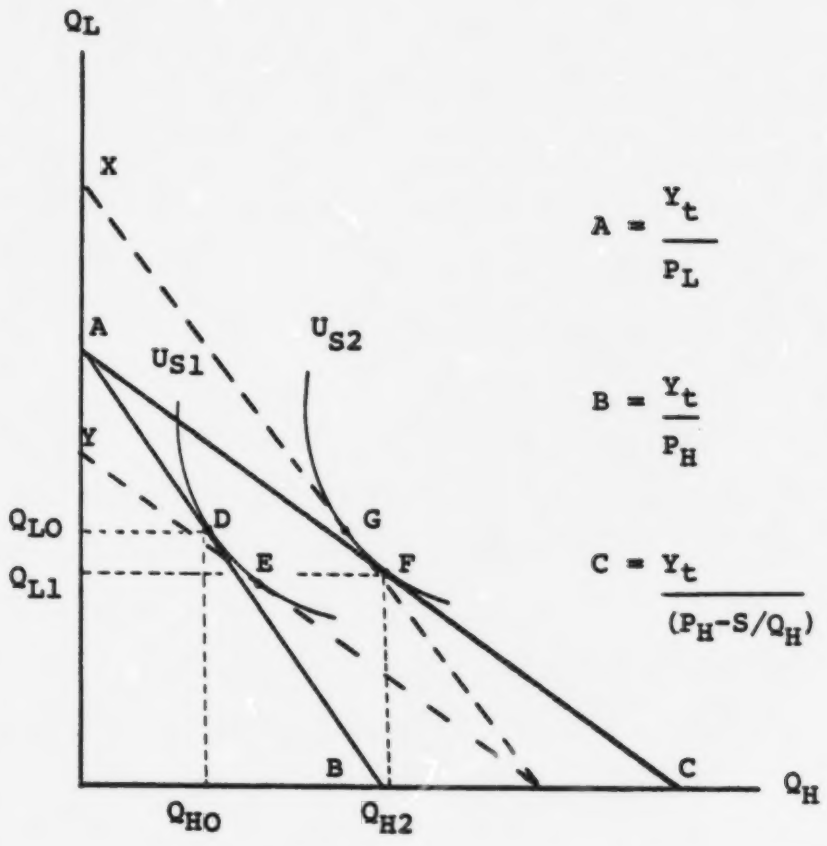
The social loss generated by failing to tax the imputed rents of homeowner-occupiers can be visualized by using the "Harberger Triangle" method (Harberger, 1964).

The effect of implicit subsidies (S) received by such owner-occupiers can be clearly seen from Figure 1. The aggregated bundle of units of housing service maximizes the social utility function $U_S = F(Q_L, Q_H)$ equals (Q_{L0}, Q_{H0}) when there are no subsidies. Homeowners consume a total of Q_{H0} at price P_H by unit of service, while renters seek to consume a total of Q_{L0} at price P_L. The aggregated expenditure respects the after-tax income restraint and works out to $Y_t = Q_L P_L + Q_H P_H$.

When a subsidy is introduced, the budgetary constraint shifts from AB to AC because, after taxes, it becomes $Y_t = Q_L P_L + (Q_H (P_H - S/Q_H))$. The number of units of service required to maximize the utility function changes from (Q_{L0}, Q_{H0}) to (Q_{L1}, Q_{H2}). It should be noted that the quantity of service

Figure 1

Effect of Implicit Subsidies on Degree of Utility



generated by rental housing drops, since agents are encouraged to become homeowners by lowering P_H by an average amount equal to S/Q_H.

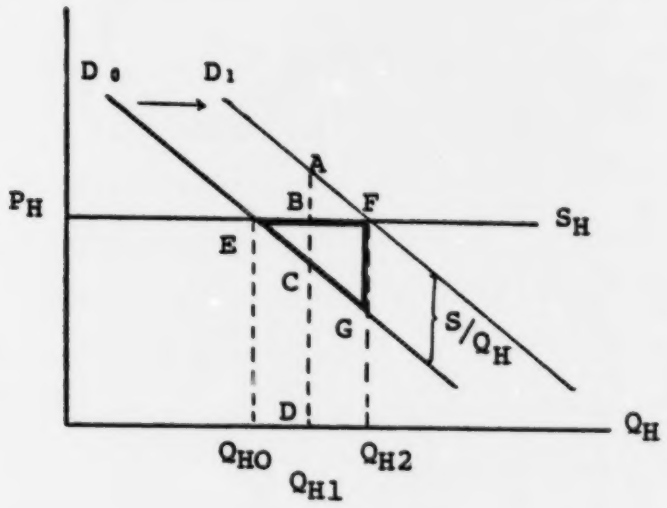
The loss in welfare can be examined by breaking down the price effect and by comparing the size of the implicit subsidy to the "compensating variation" and "equivalent variation." The compensating variation (line segment AY) is defined as the minimum transfer to agents that will prompt them to consume at the new price while remaining at U_{S1} (i.e., a move from D to E). The equivalent variation (line segment AX) represents the maximum amount agents are willing to pay in order to purchase at the non-subsidized price while remaining at U_{S2} (i.e., a move from F to G). When the implicit subsidy is larger than the compensating and equivalent variation, there will be a welfare loss.

Turning now to Figure 2, a welfare loss can also be detected as line D_0, representing aggregated demand, shifts to D_1 in the long term.[6] The gross welfare loss is represented by the outlined triangle EFG. The traditional method of explaining this triangle is as follows: marginal service to consumers at Q_{H1} is represented by the line segment DC; however, the (partly subsidized) amount paid to purchase this same service is the line segment DB; thus BC represents the welfare loss. Aaron (1970) has his own explanation for the figure EFG: AB represents only the amount required before agents will acquire Q_{H1}; the BC portion of

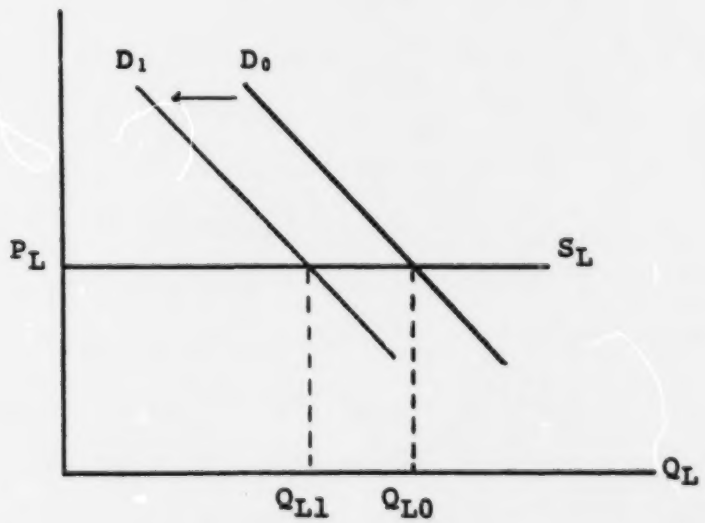
Figure 2

Plot of Welfare Cost Connected with Implicit Subsidies

Price/unit of service generated by owned property



Price/unit of service generated by rental housing



the average implicit subsidy is wasted money. The sum of all the wasted subsidy portions equals the net welfare loss.

Formally, assuming that there are no distortions in other markets and no property taxes, the size of the triangle for each consumer-homeowner i per occupied dwelling is thus:

$$-\Delta w_i = \tfrac{1}{2} \Delta P_H \Delta Q_H$$

$$= \tfrac{1}{2} \frac{dP_H}{P_H} \left(\frac{dQ_H}{Q_H}\right) P_H Q_H$$

$$= \tfrac{1}{2} \frac{dP_H}{P_H} \left(\frac{dQ_H}{dP_H} \frac{P_H}{Q_H} \frac{dP_H}{P_H}\right) P_H Q_H$$

$$= \tfrac{1}{2} \frac{dP_H}{P_H} \left(\eta \frac{dP_H}{P_H}\right) P_H Q_H \text{ where } dP_H = s = tp^*RIN$$

$$= \tfrac{1}{2} s^2 \eta P_H Q_H = \tfrac{1}{2} (tp)^2 (RIN)^2 \eta P_H Q_H \qquad (3.1)$$

$$= \tfrac{1}{2} s^2 \frac{dQ_H}{dP_H} = \tfrac{1}{2} (tp)^2 (RIN)^2 \frac{dQ_H}{dP_H} . \qquad (3.2)$$

For consumer-homeowners as a whole, the total cost of foregone welfare is: $\sum_i \sum_j - \Delta w_{ij} = \Delta W$, where $-\Delta w_{ij}$ is the welfare cost of each dwelling j occupied by an owner i.

It can be seen that the less elastic the demand curve is to price, the lower the welfare loss (given linear demand, the base of the triangle (ΔH_H) varies directly with the degree of elasticity).

It is clear that there is a positive relationship between the square of the marginal tax rate (tp), the size of net imputed rent (RIN) and welfare loss. The height of the triangle (ΔP_H) varies directly with the square of the implicit subsidy.

Assuming that $P_H = 1$, that RIN = P_H (i.e., that net imputed rent from services equals the purchase price of housing services), and that $\frac{dQ_H}{dP_H} = 1$, the following case arises:

$$-\Delta w_i = \tfrac{1}{2} (tp)^2 \qquad (3.2')$$

We know that in 1981 homeowners' average marginal tax rate (tp) was 15.8319 per cent,[7] and that the average net imputed rent (RIN) generated by each occupied property was $43,758.[8] Assuming that $dQ_H/dP_H = 1$, we can conclude that the <u>average loss</u> of welfare for each dwelling j occupied by an owner i is:

$$-\Delta w_{ij} = \tfrac{1}{2} (0.15831884 * \$43.758)^2 = \$23.9969.$$

Using the same method, the average welfare loss generated by each owner-occupied dwelling in 1980, 1982 and 1983 works out to $0, $1,238.99 and $4,476.81, respectively, assuming that owners' average marginal tax rates remained steady at 15.8319 per cent.

These losses may be socially acceptable if it felt that:

> The idea of housing...can be thought of as part of society's notion of equity or justice. Our collective notion of justice is that the distribution of income [is] not to be too unequal and that everyone is entitled to a certain basic minimum of life necessities: housing, food, education, medical care and so on.[9]

Moreover,

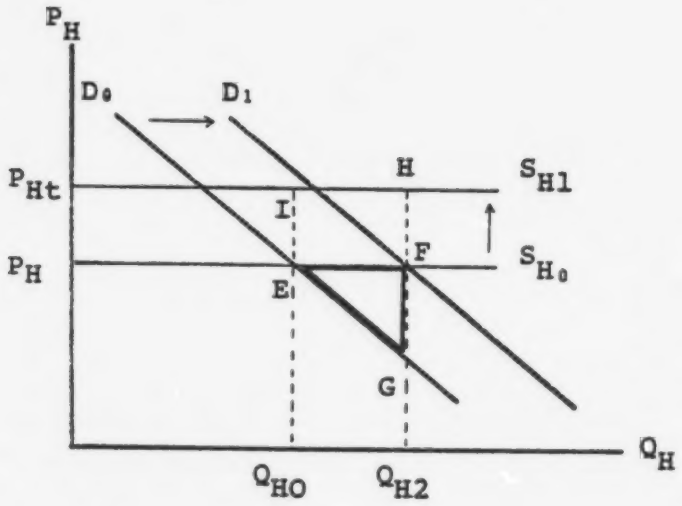
> It seems likely that in Canada housing is viewed as a merit good...a merit good may be defined more precisely as a good whose consumption contributes to social welfare beyond the utility it yields to whoever consumes it.[10]

3.3 Calculating net variation in welfare

A first examination of Figure 3 reveals that it incorporates Figure 2's representation of the gross welfare loss (triangle EFG) resulting from the presence of a subsidy. The subsidy creates a gap between the perceived value and the market price of one unit of housing service.

Figure 3

Plot of Welfare Variation



If it is assumed that there are positive distortions in other markets (such as a manufacturers' sales tax or a tax on construction materials, raising P_H to P_{Ht}), the sign of the variation in welfare caused by negative distortion (i.e., the implicit subsidy) cannot be determined.

Let us accept Harberger's well-known hypothesis to the effect that:

> ...when evaluating the net benefits or cost of a given action (project, program, or policy), the costs and benefits accruing to each member of the relevant group (e.g., a nation) should normally be added without regard to the individual(s) to whom they accrue.[11]

For reasons of simplicity, let us also assume that each homeowner i occupies only one dwelling. The net variation in welfare for the economy as a whole can therefore be formally expressed as:

$$\Delta W = \sum_i \left(-\tfrac{1}{2} s^2 \frac{dQ_H}{dP_H} + \left(tf \frac{dQ_H}{dP_H} + \sum_k t_k \frac{dX_k}{dP_H}\right)\right)$$

where tf = the marginal property tax rate

t_k = the marginal tax rate on goods X_k, divided equally over the life of the dwelling

X_k = goods and services produced by markets k.

There will be welfare gains when the area EFHI (corresponding to additional tax revenues received as a result of implicit subsidies) is larger than triangle EFG (in other words when $\sum_i (tf \frac{dQ_H}{dP_H} + \sum_k t_k \frac{dX_k}{dP_H}) > \sum_i (\frac{1}{2} s^2 \frac{dQ_H}{dP_H})$). When $2 \sum_i tf = \sum_i s^2$, $\sum_i (\sum_k t_k \frac{dX_k}{dP_H}) > 0$ must be true in order to have welfare gains.

Notes

1 See White-White (1977), p. 114; and Fallis (1983), pp. 22-23.

2 Fallis (1980), p. 39.

3 White-White (1977), p. 113.

4 Fallis (1983), p. 22.

5 For a discussion of the situation in the Canadian mortgage loan market, see Fallis (1983), pp. 16-20.

6 It is obvious that a diagram showing an increase in supplying of services can similarly be used to show a partial welfare loss.

7 Ontario's marginal tax rates (T.m.T.) and average tax rates (T.M.T.) were first adjusted in accordance with the share of provincial tax (Revenue Canada (1982)). The results were as follows:

Taxable income bracket	Federal T.m.T.	Effective T.m.T.[1]	Effective T.M.T.[1,2]
$ 0 - $ 992	6%	8.76%	8.76%
992 - 1,983	16%	23.36%	16.02%
1,983 - 3,966	17%	24.82%	20.44%
3,996 - 5,949	18%	26.28%	22.38%
5,949 - 9,915	19%	27.74%	24.52%
9,915 - 13,881	21%	30.66%	26.29%
13,881 - 17,847	23%	33.58%	27.91%
17,847 - 21,813	25%	36.50%	29.47%
21,813 - 27,762	28%	40.88%	31.91%
27,762 - 47,592	32%	46.72%	37.80%
47,592 - 77,337	36%	52.56%	43.65%
77,337 - 118,980	39%	56.94%	48.30%
118,980 - ...	43%	62.78%	

(1) Includes provincial income tax, set at 46 per cent of federal income tax.

(2) Calculated on the upper limit of income.

Using the final two columns, it can be calculated that:

$$T.m.T. = 0.003348494 + 1.199548982\ T.M.T. \quad (R^2 = 0.9916)$$

The next step was to apply this ratio for Ontario to average tax rates for all of Canada by income category (Statistics Canada (1984c), Table III, p. 15). This approach does not guarantee accurate figures for the other provinces. For example, Quebec has a completely different T.m.T. and T.M.T. structure, and each of the other Canadian provinces sets its own income tax rate as a percentage of the federal tax. For reasons of simplicity, however, the T.m.T.s so calculated were allowed to stand.

Lastly, the average marginal tax rate for Canadian homeowners was determined by weighting the average according to the distribution of homeowners by income category (the weighting factor was taken from Statistics Canada (1983), Table II, p. 30).

8 Here we used Statistics Canada's estimate of total net imputed rent in 1981 (shown in Table 2-4), divided by the total number of private, occupied and owner dwellings (excluding mobile homes and cottages) (presented in Appendix B).

$$\frac{219.4 \times 10^6}{4,266,985 + 746,918} = \$43.75$$

9 Fallis (1983), p. 12.

10 Idem, p. 11.

11 Harberger (1971), p. 785.

4 DISTRIBUTION OF TAX BURDEN UNDER TAXABLE NET IMPUTED RENTS

Chapter 2 showed that the government's own estimates clearly point to a problem of horizontal equity between homeowners and renters. Except for certain years, owner-occupiers received implicit subsidies because imputed rents were not taxable. Consequently, taxing net imputed rents would certainly make the tax system fairer horizontally.

This fourth chapter examines whether the inclusion of imputed rent in the personal income tax base would also bring about greater vertical equity among homeowners. We will examine the distribution of the tax burden among economic agents in Canada under a system of taxable imputed rents. The distribution of the tax burden will be examined according to three criteria: taxable income, age of heads of homeowner families, and population of the municipalities where the dwellings are located.

Estimated gross imputed incomes for each projection are taken from calculations carried out by Sylvester Damus from 1978 input-output tables (these estimates are listed in Appendix C). Average gross imputed rent works out to 5.2409 per cent of dwelling market value. This rate was applies to the average value of the owned home by income decile, age group and municipality population size, then average house operating expenses (excluding depreciation) were deducted in order to arrive at average net imputed rent.

4.1 Distribution of additional tax burden according to taxable income

One instinctively feels that taxing imputed rents would make the present tax system less regressive. It is obvious that homeownership is more common among high-wage earners, who are subject to high marginal tax rates. In 1978, over 47 per cent of the value of housing stock belonged to families with incomes over $23,981 (see Table 4-1). In addition, it is easy to see that properties owned by high-wage earners are more valuable than those owned by low-income families. In 1978 once again, the average value of properties owned by families with incomes over $34,728 was 41.5 per cent higher than the average value of a property in Canada. Since imputed rents would also be higher, it might be assumed that the tax base of high-wage earners would increase.

However, because house expenses for high-wage earners are higher than for those in low-income brackets (see the first half of Table 4-1), lower net imputed rents can be observed for the former group. The main factor affecting the distribution of net imputed rent from one decile to another is availability and use of mortgage loans. It can be seen from average mortgage balances as a percentage of average house values that low wage earners finance relatively little of their house purchases through mortgages, in

Table 4-1

Various Statistics on Rent and Expenses for Dwellings of Homeowner Families, by Income Bracket, 1978[1]

	Under $5,872	5,874- 8,909	8,915- 12,136	12,137- 15,177	15,182- 17,851	17,854- 20,680	20,700- 23,980	23,981- 28,136	28,139- 34,716	Over 34,728	Average
Average dwelling value	34,791.98	36,593.67	40,783.09	40,690.01	44,326.82	48,030.14	50,090.11	55,407.82	59,350.97	71,285.07	50,365.32
Gross imputed rent[2]	1,823.41	1,917.84	2,137.40	2,132.52	2,323.12	2,517.21	2,625.17	2,903.86	3,110.52	3,736.03	2,639.60
Total average expenses for owner-occupied dwellings	680.83	885.52	1,213.55	1,584.86	2,077.38	2,388.64	2,448.42	2,792.68	2,922.95	3,380.69	2,213.85
(Breakdown:											
interest payments	55.40	94.67	298.93	653.77	927.36	1,161.13	1,309.22	1,495.22	1,475.80	1,601.85	1,018.71
insurance	66.17	75.25	84.67	91.99	97.95	105.49	105.12	110.32	111.34	143.01	103.25
repairs/maintenance	218.82	355.16	386.04	356.39	470.42	499.03	413.63	445.15	560.03	665.77	459.23
property taxes)	309.16	324.70	409.73	397.39	464.37	512.82	542.30	621.70	677.17	853.73	544.52
Net imputed rent (including depreciation)	1,143.18	1,032.32	923.85	547.66	245.74	128.57	176.75	111.18	187.57	355.34	425.75
Total housing stock[3]	11,471.05	14,590.55	14,056.14	15,877.40	18,733.84	23,181.25	25,808.23	29,302.54	34,198.15	46,614.39	
Average mortgage balance	904.05	1,273.16	3,465.90	6,723.42	10,137.67	12,176.31	13,450.17	15,762.92	15,352.66	16,509.93	10,703.47
Mortgage balance as percentage of average dwelling value	2.59	3.48	8.50	16.52	22.87	25.35	26.85	28.45	22.50	23.16	21.25
Average interest payments as percentage of total average house expenses	8.14	10.69	31.18	41.25	44.64	48.61	53.47	53.54	50.50	47.38	46.02

1 Statistics Canada, Family expenditures, 1978, magnetic tape. Excludes mixed-tenure dwellings.

2 Equal to 0.052409 * average house value.

3 Millions of dollars.

this way slightly reducing their gross imputed rent. The reasons for this situation are: 1) low-wage earners find it difficult to obtain mortgage loans because of their low solvency; and 2) many are senior citizens who have already paid off their home. On the other hand, mortgage balances in the three deciles between $17,854 and $28,136 represent over 25 per cent of the average value of a house.

This heavy debt load, which for some represents over 50 per cent of total house expenses, means that the last six deciles would see relatively little increase in their tax base, while the tax bases of the first four deciles would become significantly higher. Thus a tax system under which net imputed rents are taxable would not necessarily be vertically less regressive. Such a tax system, in fact, would hit hardest at low-income homeowners without mortgages -- exactly the description of elderly homeowners. The following section will investigate the relationship between owners' age and the size of imputed rents.

4.2 Distribution of tax burden according to age of family head

The concentration of housing stock in the 25-54 age group 65.1 per cent of total value) means that this group would be harder hit by taxable imputed rents than others (see Table 4-2).

Table 4-2

Various Statistics on Rent and Expenses for Dwellings of Homeowner Families, by Age of Family Head, 1978[1]

	Age groups						
	Under 25	25-34	35-44	45-54	55-64	65-74	over 74
Total housing stocks[2]	2,948.55	43,267.09	57,391.23	51,462.03	41,904.79	25,038.34	11,821.81
Average house value	34,683.11	48,360.84	55,528.58	54,225.75	50,571.36	43,913.90	41,966.56
Average gross imputed rent[3]	1,817.71	2,534.54	2,910.20	2,841.92	2,650.39	2,301.48	2,199.43
Total average house expenses	2,905.77	3,473.40	2,926.02	2,000.87	1,436.88	938.91	884.12
Average net imputed rent (including depreciation)	-1,088.06	-938.86	-15.82	841.05	1,213.51	1,362.57	1,315.29
Total average house expenses as percentage of average house value	8.38	7.18	5.27	3.69	2.84	2.24	2.11
Average mortgage balance as percentage of average house value	61.86	45.87	29.28	15.06	6.85	1.98	0.86
Average interest payments as percentage of total average house expenses	64.53	62.78	52.89	36.90	22.66	8.14	1.40

1 Statistics Canada, Family expenditures, 1978, magnetic tape. Excludes mixed-tenure dwellings.

2 Millions of dollars.

3 Equal to 0.052409 * average house value.

The size of imputed rents for the 0-44 age group is quite different from the 45 and over group, and fits in well with the "life cycle" theory. The reason for the difference in sign lies in the ratio of average total expenses to average house market values. The ratio is high for young homeowners and low for the 75 and older age group.

The reason behind these ratios is the size of mortgage loans in relation to average house values, which mean that young homeowner families face heavy interest payments as a percentage of total house expenses. For the 25-34 age group, for instance, 45.87 per cent of the house's value is mortgaged, and interest payments on this mortgage represent 62.78 per cent of total house expenses. In the 74 and over age group only 0.86 per cent of house values are mortgaged and interest payments account for only 1 per cent of total house expenses.

Relatively speaking, then, taxing imputed rents will greatly increase the tax base of senior citizens aged 65 and over.

> ...consequently, a disproportionate tax increase will fall on the elderly, many of whom have low realized income; thus, the incidence of the tax might be socially undesirable or at least less desirable then usually considered.[1]

4.3 Distribution of additional tax burden according to municipality size

Table 4-3 indicates that 71.8 per cent of the value of total urban housing stocks is located in municipalities of over 100,000 residents. Consequently, taxing imputed rental income will have more of an effect on families living in these cities. The additional tax burden for residents of cities of more than 100,000, however, would be 49 per cent larger than in cities of under 30,000 people. Since house operating expenses usually lag behind increases in property values as population increases, the relative after-tax situation of agents will vary according to their place of residence.

Table 4-3

Various Statistics on Rents and Expenses for Dwellings of Homeowner Families, by Municipal Population, 1978[1]

	City population		
	Under 30,000	30,000-99,999	100,000 and over
Total housing stocks[2]	35,520.98	18,114.62	136,211.53
Average house value	40,607.24	45,363.67	60,444.89
Average gross imputed rent[3]	2,128.18	2,377.46	3,167.86
Total house expenses	1,825.16	2,274.62	2,717.91
Average net imputed rent	303.02	102,84[4]	449.95

1 Statistics Canada, Family expenditures, 1978, magnetic tape. Excludes rural areas and mixed-tenure dwellings.

2 Millions of dollars.

3 Equal to 0.052409 * average house market value.

4 The low figure for net imputed rent in the 30,000-99,999 group in relation to the preceding group is due to average house prices growing less quickly than total expenses.

Notes

1 Lawrence B. Smith, published in Fulton (1982), p. 99.

5 GENERAL EQUILIBRIUM MODEL SIMULATIONS

In this the final chapter, the overall impact on homeowner-occupiers of making imputed rents taxable will be examined. These simulations will be carried out using a modified version of the Ballentine-Thrisk model[1] and will be based on the Canadian economy in the year 1980. The data are derived from those used by Wayne Thirsk in his original model and have been calibrated to describe the economy in equilibrium.

The model used here adopts a static perspective in contrast to the work of Hamilton-Whalley (1985), who used a dynamic sequential equilibrium model to examine the effects of taxing implicit rental income. Their main conclusion was that taxing imputed rents increases economic welfare (in other words, welfare gains as a result of less distortion among assets are greater than welfare losses associated with increased temporal distortions). A second significant difference from Hamilton-Whalley -- and from the original Ballentine-Thirsk model -- is the disaggregation of the "housing" service component into rental housing service and owned-occupied property service. In this way the components of the consumption bundle can be compared and, more importantly, comparisons are also possible between the relative importance attributed to the consumption of rental housing and owner-occupied properties by both groups of consumers services when the system

changes from one where imputed rents are not taxable to one where they are.

We begin by analyzing the base case, which excludes from the personal income tax base imputed rents arising from inputs, after which two simulations are presented. Both represent what happens to the base-case economy when implicit rents are included in the personal income tax base. The first simulation, however, postulates that tax authorities do not lower personal tax rates (in other words, it represents the situation when tax authorities in the base case scenario decide to tax imputed rents in order to, for example, increase tax revenues). The second simulation hypothesizes that personal income tax rates are adjusted downward (since it is assumed that one objective of the tax department is to maintain revenues at current levels).

5.1 Base case

In this first section, base-case equilibrium will be analyzed, and the main variables and equations of the calculation model will be described. At the end of the section, the reader should be able to understand the tables showing simulation results.

There are eight national production activities: two export sectors (fix-price and flex-price); one corporate sector that

produces the majority of consumer and capital goods (with the exception of foodstuffs); four unincorporated private industries: one food-producing, two offering the housing services -- rental housing and owner-occupied housing -- and the commercial services sector; and finally public services and goods offered by the government.

Ten consumer groups[3] make up the simulated economy. Total allocated inputs[4] rise steadily from the first to the last decile:

	Labour	Capital	Land ($L_{j,i}$)			
	(N_j)	(K_j)	Urban rental	Urban owned	Farm	Natural resources
1	0.50500	0.92785	0.01099	0.05416	0.02234	0.01866
2	2.35500	1.06693	0.01264	0.06228	0.02234	0.02866
3	5.72000	1.99478	0.02363	0.11645	0.04802	0.04012
4	10.09400	2.13387	0.02528	0.12457	0.05137	0.04292
5	13.96400	2.18053	0.02583	0.12729	0.05250	0.04385
6	18.00200	3.47987	0.04122	0.20314	0.08378	0.06999
7	21.19800	4.64013	0.05497	0.27087	0.11171	0.09332
8	24.73100	6.03190	0.07145	0.35212	0.14522	0.12131
9	29.61000	7.77812	0.09214	0.45406	0.18726	0.15643
10	42.06000	16.70303	0.19786	0.97506	0.40212	0.33593

Note that the land allocation is a fixed proportion of current capital across all consumer groups. Allocations are expressed in billions of units (so that the first quartile holds 928 million units of capital, including the capital in the form of owner-occupied property).

There are three fixed-quantity inputs: labour (N), capital (K) and land (L). Households hold all factors of production except the foreign portion of capital. There are four land categories: urban land used for rental housing and urban land used for owner-occupied housing, land used to produce foodstuffs and land used for the production of fix-price exports. Perfect mobility of land exists only within the land-use pairs described above. There is full employment of inputs -- so there is no choice to be made between work and leisure -- and saving is considered to be a purchase of capital goods, not a substitution between present and future consumption. The price of manpower is assumed to be invariable (the "numeraire").

Table 5-1 illustrates the base case, i.e., the economy in 1980 with rental income implicitly received by owner-occupiers considered non-taxable. Part A of the table shows that there are four forms of taxation, each with a different tax rate depending on the production sector concerned: corporate income tax

Table 5-1

Base-case model -- non-taxable imputed rents

Part A

	Tax Rates		
	C.I.T.	Property	Sales
Imports			0.100
R. housing	0.868	0.577	0.000
Food	0.330	0.177	0.000
Commerce	0.348	0.000	0.049
Corporate	0.474	0.000	0.167
Fix-price	o.528	0.162	0.008
Flex-price	0.520	0.000	0.008
OO housing	0.287	0.619	0.000

Personal Income Tax Rates

Household 1	0.053
Household 2	0.126
Household 3	0.123
Household 4	0.140
Household 5	0.187
Household 6	0.186
Household 7	0.177
Household 8	0.181
Household 9	0.181
Household 10	0.215

Collections:	C.I.T.	22.688
	Property	2.371
	P.I.T.	39.01
	Sales	14.39
	Imports	4.728

Table 5-1 (cont'd.)

Part B

	Capital	Labour	Land	Output	Producer price
R. housing	1.362	4.099	0.556	7.521	1.000027
Food	4.575	11.748	1.130	19.166	0.9999952
Commerce	4.949	15.792	0	22.463	0.9999962
Corporate	15.888	53.033	0	76.458	0.9999962
Fix-price	2.903	6.653	0.944	12.186	0.9999934
Flex-price	12.863	29.210	0	48.764	0.999997
Government	3.053	45.359	0	48.412	0.9999955
OO housing	8.744	2.345	2.739	18.035	1.000062
Total	54.337	168.239	5.37		

After tax rental price of capital		1.000
Foreign capital		7.400
Exchange rate		1.008
Before-tax rents:	R. urban	1.578
	Farm	1.177
	O. urban	1.620
	Resources	1.162
Nominal wage		1.000
Elasticity of capital flows		2.506
Elasticity of flex-price export demand		-2.500

Table 5-1 (cont'd.)

Part C

	Household Demands					
	R. Housing	Food	Commerce	Corporate	Imports	OO Housing
1	0.857	0.918	0.714	1.385	0.936	0.322
2	0.927	1.331	1.120	2.367	1.121	0.637
3	0.931	1.461	1.458	3.616	1.932	0.795
4	1.061	1.640	1.812	4.652	2.547	1.044
5	0.816	1.860	2.057	5.551	2.950	1.515
6	0.751	2.036	2.265	6.958	4.351	1.947
7	0.717	2.223	2.565	8.755	5.291	2.266
8	0.592	2.319	2.855	10.532	6.430	2.681
9	0.452	2.538	3.302	12.722	8.118	3.126
10	0.418	2.840	4.316	19.922	13.388	3.701
Sum	7.522	19.166	22.463	76.459	47.065	18.036
	Consumer Prices					
	1.000	1.000	1.050	1.167	1.109	1.000

Table 5-1 (cont'd.)

Part D

	Income				Imputed
	Before-tax	After-tax	Taxes	Utility	not taxed
Consumer 1	1.539	5.500	-3.961	5.125	0.169
Consumer 2	3.544	8.074	-4.530	7.491	0.324
Consumer 3	7.943	11.079	-3.136	10.180	0.413
Consumer 4	12.472	13.900	-1.428	13.741	0.536
Consumer 5	16.394	16.098	0.295	14.731	0.766
Consumer 6	21.880	20.054	1.825	18.286	0.994
Consumer 7	26.369	23.983	2.385	21.794	1.165
Consumer 8	31.453	28.010	3.442	25.383	1.386
Consumer 9	38.278	33.431	4.846	30.229	1.627
Consumer 10	60.674	49.584	11.090	44.545	2.034
Total	220.546	209.716	10.830		9.418

Foreign 7.40015
Tax revenue 83.1908

Trade Deficit = -1.129739E-03 % of income
Income differs from expenditure by 4.410744E-04%

Hicksian variation: Compensating 0
Equivalent 0

(C.I.T.), which includes property taxes on the reproducible portion of capital (buildings), land property tax (Property), manufacturers' sales tax and import sales tax (Sales); and a single tax on personal factor income (P.I.T.) with an average tax rate varying from decile to decile.[5] Lastly, total tax revenues ($83 billion) are presented, disaggregated by tax base (line labelled "Collections").

Part B of Table 5-1 gives the amount of primary inputs (in billions of units -- see the first three columns) needed in each production sector to produce goods and services (in billions of units. Each production activity i adopts a profit-maximization strategy in perfect competition and has a production function (C.E.S.)[6] as follows:

$$Q_i = \phi_i \{(1-\theta_i)\{[\delta_i N_i^{-\rho i} + (1-\delta_i)K_i^{-\rho i}]^{-1/\rho i}\}^{-\nu i} + \theta_i (L_i)^{-\nu i}\}^{-1/\nu i}$$

where Q_i = production volume (in billions of units) of activity i (i = 1 ... 7)

ϕ_i = the productivity parameter

θ_i = the land distribution parameter

δ_i = the manpower distribution parameter

$\rho_i = \frac{1}{\sigma_{K,N,i}} - 1$ where $\sigma_{K,N,i}$ is substitution elasticity between K and N

$\nu_i = \frac{1}{\sigma_{KN,L,i}} - 1$

N_i, K_i, L_i are essential production inputs

	$\sigma_{K,N}$	$\sigma_{KN,L}$	δ	Θ	ϕ
R. housing	0.60	0.60	0.7705	0.0418	2.8937
Food	0.75	0.60	0.7255	0.0186	2.3603
Commerce	0.60	0	0.8369	0.0000	1.8475
Corporate	0.80	0	0.7537	0.0000	2.0099
Fix-price	0.85	0.60	0.6345	0.0322	2.7593
Flex-price	0.90	0	0.6207	0.0000	2.2990
Government	0.80	0	0.9669	0.0000	1.2103
OO housing	0.60	0.60	0.0798	0.1434	2.9289

The producer price (P_i -- see column labelled "Producer Price") is equal to the cost of production per unit produced:

$$P_i = \frac{K_i * P^*_{K,i} + N_i * P^*_{N,i} + L_i * P^*_{L,i}}{Q_i}$$

where $P^*_{K,i}$ = before-tax rental price of capital

$P^*_{N,i}$ = before-tax price of manpower

$P^*_{L,i}$ = land rent before property taxes

At the bottom of Part B, the prices associated with this production cost constraint are listed, namely: after-tax rental price of capital on corporate capital income ($P_K = P^*_{K,i}(1-t_{K,i})$ where $t_{K,i}$ is the capital income tax rate applicable to activity i); the rental price of different types of land before property taxes ($P^*_{L,i} = P_{L,i}(1+t_{L,i})$ where $t_{L,i}$ is the property tax rate

for activity i); the before-tax price of hiring one manpower unit ($P^*_{N,i}$). In addition, the portion of capital from foreign sources is given in the line labelled "Foreign Capital."

Part C of Table 5-1 gives, for each decile j, the quantity of goods and services demanded (in billions of units) that maximizes the utility function C.E.S.:[7]

$$U_j = \left\{ \sum_{i=1}^{6} \alpha_{ij}^{1/\beta j} D_{ij}^{1-1/\beta j} \right\}^{\frac{\beta_j}{\beta j - 1}}$$

where α_{ij} = the parameter describing the distribution of good i associated with consumer j

β_j = the substitution parameter

D_{ij} = the quantity of good i demanded by quartile j

	α						β
	R. housing	Food	Commerce	Corpo-rate	Imports	OO housing	
1	0.1603	0.1718	0.1375	0.2839	0.1862	0.0603	0.5910352
2	0.1184	0.1700	0.1472	0.3309	0.1522	0.0814	0.5820386
3	0.0870	0.1366	0.1402	0.3700	0.1919	0.0743	0.5852491
4	0.0792	0.1224	0.1390	0.3798	0.2018	0.0779	0.5837303
5	0.0526	0.1200	0.1364	0.3913	0.2019	0.0978	0.5749911
6	0.0389	0.1056	0.1208	0.3943	0.2394	0.1010	0.5735912
7	0.0312	0.0965	0.1145	0.4155	0.2439	0.0984	0.5748256
8	0.0221	0.0863	0.1093	0.4285	0.2540	0.0998	0.5742432
9	0.0141	0.0792	0.1060	0.4341	0.2690	0.0976	0.5752789
10	0.0088	0.0599	0.0936	0.4598	0.2999	0.0780	0.5839438

(The number of utils received by each decile is shown in Part D in the column labelled "Utility.")

It can be seen that households consume five types of goods and services, namely: imports and the four outputs that are not sold on foreign markets. Low- and middle-income consumers display a relatively large consumption of rental housing (and vice versa for owner-occupied housing). It can be seen that the net production supply of each activity (column labelled "Output" in Part B) is entirely absorbed by consumer demand (line labelled "Sum" in Part C), and that the consumer price per unit of goods or services is equal to the unit cost of production (P_i) plus manufacturers' sales tax where applicable (line labelled "Consumer Price"). In other words, the consumer price is equal to the net revenue per unit received by the producing firm plus sales tax.

The first column of Part D of Table 5-1 ("Income Before Tax") lists total disposable income before transfers and personal taxes (Y^*_j) in billions of dollars. This budgetary constraint is calculated as follows:

$$Y^*_j = (P_K * K_j) + (P_N * N_j) + \left(\sum_{i=1}^{4} P_{L,i} * L_{j,i}\right)$$

and <u>includes imputed rents</u>. The second column ("Income After Tax") shows total disposable income after transfers and personal taxes (Y_j). However, since imputed rents are not taxable in our equilibrium base case,[8] these must be subtracted from income Y^*_j for each of the 10 consumer groups. Thus:

$$RI^*_j = \frac{D_{prop,j}}{Q_{prop}} * P_K * K_{prop} + \frac{L_{prop,j}}{Q_{prop}} * p^*_{L,prop} * L_{prop}$$

where RI^*_j = total net imputed rent received by consumer group j before taxes[9]

$\frac{D_{prop,j}}{Q_{prop}}$ = the share of total production of owner-occupied housing services consumed by consumer group j

P_K = the after-tax rental price of capital

K_{prop} = the total amount of capital necessary to produce owner-occupied housing services

$\frac{L_{prop,j}}{Q_{prop}}$ = the ratio of the initial allocation of urban land held by consumer group j to total owner-occupied housing services produced

$p^*_{L,prop}$ = the rental price of urban land used to produce owner-occupied housing services (before property taxes)

L_{prop} = the total volume of urban land needed to produce owner-occupied housing services

(The estimated values of these rents (in billions of dollars) can be found in the last column of Part D labelled "Imputed Y.")

Thus the estimated budget constraints operating in our base case scenario can be calculated as follows:

$$Y_j = \{(Y^*_j - RI^*_j) * (1 - tp_j)\} + RI^*_j + TR_j$$

where tp_j = the personal income tax rate applicable to individuals in group j

TR_j = money received in government transfer payments by group j.[10]

The third column ("Taxes") shows individual income taxes paid minus transfer payments. At the bottom of the column (line labelled "Tax Revenue"), the figure for total tax revenues from all sources (in billions of dollars) is given. Hicksian variations can be found at the bottom of Part D. The compensating and equivalent variations are calculated as follows:

$$V.C. = \sum_{j=1}^{10} \left\{ \frac{U^N_j - U^{\cdot}_j}{U^N_j} * Y^N_j \right\}$$

$$V.E. = \sum_{j=1}^{10} \left\{ \frac{U^N_j - U^{\cdot}_j}{U^{\cdot}_j} * Y^{\cdot}_j \right\}$$

5.2 Taxable imputed rents -- Simulation 1

Besides hypothesizing that imputed rents are included in personal taxable income -- i.e., $Y_j = Y^*_j\ (1-tp_j) + TR_j$, this first simulation also assumes that personal income tax rates do not change.

A summary of the results is presented in Part E of Table 5-2. In examining the new equilibrium, only those shocks of particular interest to us were looked at. Moreover, because the assessment of imputed rents per decile is biased, it was decided to proceed with a global analysis rather than examining the consumer groups individually.

Obviously, tax revenues rise as a result of implicit rents becoming taxable (from $83.19 to 84.99 billion). This increase is the result of an expansion of the personal income tax base -- tax revenues from personal income taxes rise from $39.011 to 40.643 billion -- and of a drop from $44.18 to 43.85 billion in total tax revenues from production sectors.

Table 5-2

Taxable imputed rents -- first simulation

Part A

	Tax Rates		
	C.I.T.	Property	Sales
Imports			0.09963
R. housing	0.86848	0.57734	0.00000
Food	0.33035	0.17699	0.00000
Commerce	0.34802	0.00000	0.04951
Corporate	0.47439	0.00000	0.16703
Fix-price	0.52824	0.16208	0.00837
Flex-price	0.52025	0.00000	0.00835
OO housing	0.28694	0.61934	0.00000

Personal Income Tax Rates

Household 1	0.0528
Household 2	0.1263
Household 3	0.1229
Household 4	0.1402
Household 5	0.1868
Household 6	0.1859
Household 7	0.1774
Household 8	0.1811
Household 9	0.1807
Household 10	0.2146

Collections:	C.I.T.	22.517
	Property	2.347
	P.I.T.	40.643
	Sales	14.291
	Imports	4.690

Table 5-2 (cont'd.)

Part B

	Capital	Labour	Land	Output	Producer price
R. housing	1.364	4.091	0.558	7.521	0.997
Food	4.571	11.690	1.135	19.109	0.997
Commerce	4.938	15.706	0	22.363	0.998
Corporate	15.852	52.677	0	76.049	0.998
Fix-price	2.870	6.549	0.938	12.026	0.996
Flex-price	12.862	29.062	0	48.617	0.997
Government	3.118	46.131	0	49.250	0.999
OO housing	8.718	2.330	2.737	17.982	0.994
Total	54.297	168.239	5.370		

After tax rental price of capital		0.9944
Foreign capital		7.3603
Exchange rate		1.0048
Before-tax rents:	R. Urban	1.5631
	Farm	1.1585
	O. Urban	1.6047
	Resources	1.1438
Nominal wage		1.0000
Elasticity of capital income		2.5359
Elasticity of flex-price export demand		-2.5000

Table 5-2 (cont'd.)

Part C

Household Demands

	R. housing	Food	Commerce	Corporate	Imports	OO housing
1	0.868	0.929	0.723	1.401	0.948	0.327
2	0.933	1.340	1.127	2.382	1.130	0.642
3	0.934	1.466	1.461	3.625	1.939	0.799
4	0.061	1.641	1.811	4.650	2.549	1.046
5	0.812	1.852	2.047	5.524	2.939	1.512
6	0.746	2.024	2.250	6.913	4.328	1.940
7	0.713	2.211	2.549	8.701	5.264	2.257
8	0.589	2.305	2.836	10.460	6.392	2.669
9	0.449	2.522	3.279	12.632	8.068	3.111
10	0.415	2.819	4.281	19.762	13.294	3.680
Sum	7.522	19.110	22.364	76.050	46.850	17.983

Consumer Prices

0.997	0.997	1.048	1.165	1.105	0.994

Table 5-2 (cont'd.)

Part D

	Income			Utility	Imputed not taxed
	Before-tax	After-tax	Taxes		
Consumer 1	1.532	5.553	-4.021	5.189	0.1708
Consumer 2	3.536	8.110	-4.574	7.545	0.3249
Consumer 3	7.929	11.085	-3.155	10.212	0.4135
Consumer 4	12.457	13.865	-1.407	12.741	0.5347
Consumer 5	16.378	15.987	0.391	14.668	0.7599
Consumer 6	21.855	19.885	1.970	18.180	0.9847
Consumer 7	26.336	23.785	2.551	21.671	1.1545
Consumer 8	31.411	27.758	3.562	25.222	1.3728
Consumer 9	38.224	33.123	5.100	30.030	1.6110
Consumer 10	60.558	49.082	11.476	44.210	2.0124
Total	220.222	208.237	11.984		9.3396

Foreign 7.319321
Tax revenue 84.49008

Trade Deficit = -1.129739E-03 % of income
Income differs from expenditure by 4.410744E-04%

Hicksian variation: Compensating -0.08806
Equivalent -0.09022

Table 5-2 (cont'd.)

Part E	Base case	Simulation 1	Relative variation
Total volume consumed (billions of units)			
owner-occupied housing services	18.036	17.983	-0.00294
rental housing services	7.522	7.522	0
Relative price			
one service unit of owner-occupied housing compared to rental housing	1.000035	0.997235	-0.0028
capital compared to labour	1.00004	0.9944258	-0.00561
urban land for property compared to labour	1.619761	1.604737	-0.00928
Total imputed rents ($ billions)	9.418896	9.339656	-0.00841
Total available after-tax income including imputed rents ($ billions)	209.7162	208.2376	-0.00705
Total tax revenues ($ billions)	83.1908	84.4901	0.01562
Compensating variation ($ millions)		-88.0613	

In addition, there is the expected decline in the total volume of owner-occupied housing service units consumed (from 18.036 to 17.983 billion units), which leads to a drop in production and, in turn, to changes in the capital intensity of the industry (relatively greater use of capital compared to labour). There is also a drop in the relative price of owner-occupied dwellings compared to rental housing (from 1.00 to 0.99724). Total imputed rents fall from $9.4189 to 9.3397 billion.

The freezing up of inputs to the production of owner-occupied housing services prompts changes in the relative use of inputs in other production activities which leads at equilibrium to a drop in the price of capital relative to labour (from 1.00 to 0.99443). Similarly, the demand for various types of land from producers with relatively land-intensive manufacturing operations tending to fall, implies that the four figures for before-tax land rents also decline.

Volume of production in all sectors falls except for government production, which rises because it absorbs -- thanks to increased tax revenues -- all unused labour and capital inputs. This decline in overall supply is the result of a fall in personal disposable after-tax income. In fact, total disposable income after taxes (including taxable imputed rents and cash transfers) fall from $209.7162 to 208.2376 billion.

In conclusion, making imputed rents taxable with the sole goal of increasing the tax base leads to a drop in overall demand and a reduction in economic welfare. Thus $88 million would be required ex-post to compensate all economic agents (compensating variation).

5.3 Taxable imputed rents -- Simulation 2

Here it is assumed that the same base-case economy decides to expand the tax base by making implicitly received rents taxable. However, the objective here is to maintain stable tax revenues by making adjustments to the personal income tax rate schedule -- see Part A of Table 5-3.

By allowing tax rates to fall, distortions are reduced and the relative prices of goods and inputs approximate the truth. At equilibrium there should thus be an increase in overall demand (and symmetrically in overall supply). This assumption can be checked by examining total personal after-tax factor income derived from factors, which rises from $209.7156 to $209.7209 billion.

Making imputed rents taxable appreciably reduces the volume of total consumption of owner-occupier housing services (from 18.036

Table 5-3

Taxable imputed rents -- second simulation

Part A

	Tax Rates		
	C.I.T.	Property	Sales
Imports			0.09963
R. housing	0.86848	0.57734	0.00000
Food	0.33035	0.17699	0.00000
Commerce	0.34802	0.00000	0.04951
Corporate	0.47439	0.00000	0.16703
Fix-price	0.52824	0.16208	0.00837
Flex-price	0.52025	0.00000	0.00835
OO housing	0.28694	0.61934	0.00000

	Personal Income Tax Rates
Household 1	0.0506
Household 2	0.1210
Household 3	0.1178
Household 4	0.1344
Household 5	0.1790
Household 6	0.1782
Household 7	0.1700
Household 8	0.1736
Household 9	0.1732
Household 10	0.2056

Collections:	C.I.T.	22.6883
	Property	2.3711
	P.I.T.	39.0129
	Sales	14.3933
	Imports	4.7287

Table 5-3 (cont'd.)

Part B

	Capital	Labour	Land	Output	Producer price
R. housing	1.361	4.096	0.5559	7.516	1.000030
Food	4.574	11.745	1.1300	19.160	1.000019
Commerce	4.948	15.790	0	22.460	1.000025
Corporate	15.890	53.037	0	76.466	1.000025
Fix-price	2.903	6.654	0.9437	12.189	1.000015
Flex-price	12.862	29.209	0	48.763	1.000025
Government	3.053	45.359	0	48.412	1.000027
OO housing	8.744	2.345	2.7400	18.035	1.000033
Total	54.337	168.239	5.3700		

After tax rental price of capital		1.00002
Foreign capital		7.40013
Exchange rate		1.00838
Before-tax rents:	R. Urban	1.57744
	Farm	1.17690
	O. Urban	1.61945
	Resources	1.16199
Nominal wage		1.00002
Elasticity of capital income		2.50619
Elasticity of flex-price export demand		-2.50000

Table 5-3 (cont'd.)

Part C

Household Demands

	R. housing	Food	Commerce	Corporate	Imports	OO housing
1	0.856	0.917	0.713	1.383	0.935	0.322
2	0.924	1.327	1.117	2.360	1.118	0.635
3	0.930	1.460	1.456	3.613	1.930	0.794
4	1.061	1.640	1.811	4.651	2.547	1.044
5	0.815	1.858	2.055	5.545	2.947	1.514
6	0.750	2.034	2.263	6.952	4.348	1.946
7	0.717	2.222	2.564	8.751	5.289	2.265
8	0.592	2.318	2.854	10.527	6.426	2.680
9	0.452	2.538	3.302	12.720	8.116	3.126
10	0.419	2.846	4.325	19.964	13.416	3.709
Sum	7.516	19.160	22.460	76.466	47.073	18.035

Consumer Prices

1.000	1.000	1.050	1.167	1.109	1.000

Table 5-3 (cont'd.)

Part D

	Income				Imputed
	Before-tax	After-tax	Taxes	Utility	not taxed
Consumer 1	1.539	5.495	-3.956	5.120	0.1694
Consumer 2	3.544	8.052	-4.508	7.471	0.3232
Consumer 3	7.943	11.069	-3.126	10.170	0.4136
Consumer 4	12.472	13.898	-1.426	12.739	0.5368
Consumer 5	16.394	16.083	0.311	14.716	0.7653
Consumer 6	21.880	20.039	1.841	18.272	0.9934
Consumer 7	26.369	23.971	2.398	21.783	1.1648
Consumer 8	31.453	27.996	3.457	25.370	1.3860
Consumer 9	38.278	33.425	4.853	30.223	1.6273
Consumer 10	60.675	49.689	10.985	44.639	2.0381
Total	220.551	209.720	10.830		9.4182
Foreign	7.400				
Tax revenue	83.192				

Trade Deficit = -1.129739E-03 % of income
Income differs from expenditure by 4.410744E-04%

Hicksian variation: Compensating 0.001456
Equivalent 0.001455

Table 5-3 (cont'd.)

Part E	Base case	Simulation 2	Relative variation
Total volume consumed (billions of units)			
owner-occupied housing services	18.036	18.035	-0.000055
rental housing services	7.522	7.516	-0.000798
goods produced by corporate sector	76.459	76.466	0.000092
imported goods	47.065	47.073	0.0001699
fix-price exported goods	12.18614	12.18919	0.0002502
Relative price			
one service unit of owner-occupied housing compared to rental housing	1.000035	1.000003	-0.000032
capital compared to labour	1.00004	0.999992	-0.0000119
urban land for property compared to labour	1.619761	1.619411	-0.000216
Total imputed rents ($ billions)	9.418896	9.418296	-0.0000637
Total available after-tax income including imputed rents ($ billions)	209.7162	209.7209	0.00002241
Compensating variation ($ millions)		1.4557	

to 18.035 billion units), leading to a drop in production and, in turn, to adjustments in the use of inputs. Thus the relative capital intensity in this production activity rises slightly from 3.728777 to 3.728799. The freeing up of inputs in the owner-occupied housing sector leads to adjustments in other manufacturing processes (the corporate and fix-price export sectors will absorb these inputs). These moderate adjustments in resource allocation do not produce any noticeable change in the relative prices of inputs. Consequently, no significant relative rise in consumer prices appears (the relative price of one unit of owner-occupied housing service to one of rental housing drops at 1.000003 from 1.000035).

Consequently, pursuing the objective of stable tax revenues by adjusting personal tax rates downward when imputed rents are made taxable leads to an imperceptible rise in economic welfare. At equilibrium, there is a slight rise in overall demand -- primarily in the form of goods and services produced in the corporate, import and fix-price export sectors. Ex ante, agents would be prepared to spend $1.456 million to reach this new equilibrium point. Judging from the lack of severity of shocks caused by the inclusion of imputed rents in the tax base, it appears that the fact that such rents are not taxable is not a source of significant distortion.

Notes

1 The original model is described in Ballentine-Thirsk (1979), Damus (1985) and Thirsk (1985).

2 These data are taken, for the most part, from the National Accounts, input-output tables, consumer expenditures and tax expenditures. An explanation of the data and their derivation can be found in Thirsk (1985, pp. 50-66).

3 The ten consumer groups correspond to the "deciles" defined by Thirsk (1985, Table A-7, p. 112), as follows:

Group	Income Bracket
1	$8,500 and under
2	$8,501 - $12,700
3	$12,701 - $17,300
4	$17,301 - $22,300
5	$22,301 - $26,800
6	$26,802 - $31,000
7	$31,001 - $36,000
8	$36,001 - $42,000
9	$42,001 - $50,000
10	$50,000 and over

4 These allocations were taken from Thirsk (1985, pp. 68-70). The units of the various production inputs are defined so that the net income (before personal taxes) of factor owners is one dollar per unit offered.

5 Tax rates in production sectors can be considered implicit (or effective) tax rates. The derivation of capital and property tax rates can be seen from Table A-5 (Thirsk (1985), p. 110). However, since in the original version of the model the "housing services" sector was an aggregate of "rental housing services" and "owner-occupied housing services," these data must now be separated. Thus:

	(1)	(2)	(3)
Rental housing	427	755	321
Owner-occupied housing	179	2,330	1,697
	606	3,085	2,018

where: (1) total tax paid on capital income ($ millions)
(2) total property taxes paid on reproducible portion of capital
(3) land taxes

For example, in the case of rental housing, the rate of 86.848 per cent is derived from the total capital tax payment of $1.182 billion (427 + 755) for a capital income of $1.362 billion (see first column of Part B). Also, the property tax rate of 57.73 per cent is derived from the total tax payment of $321 billion on a total land rent of $556 million (see third column of Part B).

Examining now the personal income tax schedule, for certain quartiles there is no progress at all. This is because the use of income brackets involves aggregating the characteristics that distinguish one decile from another. But these same characteristics are responsible for differences in tax treatment; this is the source of the fluctuations observed in personal tax rates.

6 Fix-price exports are set at 20 per cent of total exports, so that i may vary from 1 to 7.

For an explanation of factor substitution parameters, see Thirsk (1985, p. 56).

The following example is for the owner-occupied housing services production activity:

$$Q = 2.9289 \{(1 - 0.1434) \{[0.0798+(2.345104)^{-\rho} + (1-0.0798) + (1-0.0798)*(8.74437)^{-\rho}]^{-1/\rho}\}^{-\nu} + (0.1434)*2.739695)^{-\nu}\}^{-1/\nu} = 18.0336 \text{ units}$$

where $-\rho = 0.666$, $-\nu = -0.666$

7 Utility at equilibrium for the tenth consumer group works out to:

$$U = (0.0088^{1/\beta}*0.418^{1-1/\beta} + 0.0599^{1/\beta}*2.84^{1-1/\beta} + 0.0936^{1/\beta}*4.316^{1-1/\beta} + 0.4599^{1/\beta}*19.922^{1-1/\beta} + 0.2999^{1/\beta}*13.388^{1-1/\beta} + 0.078^{1/\beta}*3.701^{1-1/\beta})^{\frac{\beta}{\beta-1}}$$

$$= 44.553 \text{ utiles}$$

where $\beta = 0.5839438$.

8 Because taxable capital income as defined by Thirsk includes imputed rents (i.e., capital allocations (K_j) include imputed rent), our base case does not match that used by Thirsk.

9 This calculation method does not allow us to assign to each consumer group a different expenditure structure for owner-occupied housing consumption. Thus the estimates of imputed rent for owners in the middle of the income distribution will be high (in other words, the distribution of net imputed rents will not follow the same pattern as in Table 4-1).

10 TR_j is calculated as follows:

$$TR_j = (1 - GVT)(Y_G - IMP) * tr_j$$

where GVT = the proportion of government revenues financing the production of public goods (= 0.6320682)

Y_G = total tax revenues

IMP = fixed exogenous government imports (= $6.598 billion)

tr_j = individual j's share of transfer payments

		tr_j
Household	1	0.1431
Household	2	0.1752
Household	3	0.1441
Household	4	0.1101
Household	5	0.0931
Household	6	0.0731
Household	7	0.0741
Household	8	0.0711
Household	9	0.0631
Household	10	0.0530

Thirsk (1985, Table A-7, p. 112)

CONCLUSION

According to standard theory, there is no trade-off between equity and efficiency involved in making owner-occupier imputed rents taxable. Aside from increased complexity, there is everything to gain.

However, when we subject this question to normative analysis, it is clear that greater vertical equity among homeowners is not at all certain. It may indeed be socially unacceptable to add to the tax burden, since at least part of it would fall squarely on the shoulders of elderly homeowners. Full horizontal equity between renters and homeowners would certainly result, however.

The general equilibrium model demonstrates that making implicit rents taxable with the sole goal of increasing the revenues would introduce additional distortion into the economy. This new distortive element would have a depressive effect on overall demand, leading to a decline in economic welfare. The calculation model also showed that expanding the personal income tax base to include imputed rents while maintaining tax revenues at the same level by reducing personal tax rates would lead to an imperceptible improvement in economic efficiency. The gains associated with taxing imputed rents would be relatively negligible.

It is not clear whether the cost of collecting tax on imputed rents would always be less than the additional revenues involved. For one thing rents vary widely from one year to another depending on the economic climate, and the problems posed in implementing such a tax are also formidable.

It is not possible to tax imposed rents without making some degree of compromise between full horizontal equity and significantly greater economic efficiency, on the one hand, and worsened vertical equity and formidable administrative complexity, on the other.

The debate over taxable imputed rents takes on another dimension when the problems involved with non-taxable capital gains and non-deductible mortgage payments enter into the discussion.

> The Carter Commission rejected the idea of making mortgage interest payments deductible and criticized the mortgage interest deduction because it discriminated against the renter. It failed to recognize that in denying the deductibility of mortgage interest, the Canadian tax system discriminates against the homeowner with a large mortgage and in favour of the homeowner who has clear title. It is undesirable for a tax system to discriminate against the 35 per cent of households that live in rental accommodations. Equally, it is undesirable for a tax system to fail to discriminate among the 65 per cent of households in owner-occupied dwellings whose equity ranges from almost 0 to 100 per cent. It is submitted that the

> only really satisfactory way of solving this dilemma is to include the imputed rental value of owner-occupied dwellings in income and permit mortgage interest and related expenses to be deducted. This would be fair between renters and homeowners and among homeowners with varying amounts of equity in their homes. Eventually, the imputed rental value of owner-occupied homes will have to be included in the income tax base in both the United States and Canada.[1]

Such a proposal invariably provokes an emotional response.

> I come to you as a person who supports the principle of individual enterprise and responsibility, and as a person who feels that governments in general represent the greatest potential threat to individual freedom.... The proposal to impute rent is not new and is viewed gluttonously and covetously by some in Ottawa.... The growth of government should not be encouraged by the expansion of its tax base.[2]

And again,

> Our only motivation for owning a home was and is to provide a home for our family, not...to accumulate wealth in our home.... For myself and most of my neighbours home ownership is still the American dream.[3]

Notes

1 Bale (1985), pp. 287-288.

2 D. J. Matthews in Fulton (1982), pp. 95-96.

3 Business Week, (1985).

APPENDIX A

Definitions and explanation of Table 2-2

1. Definition of construction types:

Royal Trust provides the following definitions for the six types of construction included in its survey. They were used without change in our table.

Detached bungalow -- one-storey structure of brick and wood with aluminium or stucco; five to eight years old; three bedrooms; 1.5 bathrooms; single garage; finished basement; interior measuring 111.48 square meters, excluding garage; lot size of 510.95 square meters.

Detached two storey -- two-storey structure, first storey in brick, second in aluminium or stucco; five to eight years old; four bedrooms; 2.5 bathrooms; family room on first floor; entrance hall; double garage; finished basement; interior measuring 185.8 square meters, excluding garage; lot size of 603.85 square meters.

Standard condominium townhouse -- brick and wood construction with aluminium or stucco; two to five years old; five main rooms including three bedrooms; 1.5 bathrooms; carpeted; single garage;

unfinished basement; stove; refrigerator; interior measuring 102.19 square meters; use of swimming pool.

Luxury condominium townhouse -- mixed brick, wood, aluminium and stucco construction; two to five years old; six main rooms including three bedrooms; two bathrooms; upgraded carpeting; double garage; unfinished basement; stove; refrigerator; dishwasher; interior measuring 148.64 square meters; use of swimming pool and other recreational facilities.

Standard condominium apartment -- located in housing complex two to five years old; four main rooms including two bedrooms; carpeted; 1.5 bathrooms; small balcony; stove; refrigerator; parking space; interior measuring 83.61 square meters; use of swimming pool and other recreational facilities.

Luxury condominium apartment -- located in housing complex two to five years old; six main rooms including two bedrooms and a family room; upgraded carpeting; two bathrooms; large balcony; washer-dryer; dishwasher; stove; refrigerator; storage area; parking space; interior measuring 130.06 square meters; use of swimming pool, sauna and other recreational facilities.

2. Royal Trust's methodology

Because it has extensive experience in the rental housing market through its own residential rental services, Royal Trust is able to rely on its own good judgement in appraising homes.

Royal Trust bases the potential rental value of a dwelling on the rental price of a similar dwelling in a similar area rented out a few weeks earlier. (Reference: telephone interview with Paul Vallée, vice president and general director of residential real estate at Royal-Lepage, Québec region.)

3. Construction of Table 2-2

The "estimated monthly rental/price October 1, 1982" ratios were added up by province for each construction type and for each city in the sample. The averages of these ratios by type of construction and by province are found under "Monthly rental value."

Example: Calculating ratio for luxury condominium apartments in Quebec

	Price October 1, 1982	Estimated monthly rental
Chomedy	105,000	1,100
Charlesbourg	77,000	1,000
Hull	74,500	625

Thus (1,100/105,00 + 1,000/77,000 + 625/74,500)/3 = 0.0106175.

The number of municipalities in the sample by type of construction is listed in the following table:

	Mari.	Que.	Ont.	Man. Sask.	Alta.	B.C.
Detached bungalow	18	27	48	9	22	17
Detached two-storey	17	26	48	8	21	17
Standard condominium townhouse	3	8	42	6	18	15
Luxury condominium townhouse	2	3	28	2	13	11
Standard condominium apartment	1	5	33	2	2	15
Luxury condominium apartment	3	3	25	10	7	9

The "monthly provincial and national average" is derived from the non-weighted average provincial ratios and does not take into account the type of construction. The "yearly provincial and national average" is the "monthly provincial and national average" multiplied by 12.

There are two remarks to make about Table 2-2. The low representation for certain construction types in the municipalities sample means that these ratios must be used with caution. In addition, these ratios are only applicable to urban areas.

APPENDIX B

Value and size of housing stocks from 1977 to 1983[1]

	Net housing stocks at year end[2,3]		Number of occupied single homes[3]		Number of occupied dwellings in multiple-unit buildings		Total number of dwellings[4]
	(current $ millions)	(constant 1971 $ millions)	owned	rented	owned	rented	
1977	161,514.14	74,985.02	3,802,681	419,951	705,617	2,390,851	7,741,213
1978	181,156.73	78,284.22	3,917,365	445,392	715,509	2,435,834	7,967,345
1979	200,466.78	81,520.19	4,052,254	470,026	722,205	2,498,715	8,186,087
1980	188,068.78	83,982.49	4,175,686	495,583	732,267	2,573,164	8,355,747
1981	246,397.94	86,565.04	4,266,985	532,818	746,918	2,643,979	8,521,485
1982	249,845.56	88,084.63	4,348,278	553,913	762,011	2,708,598	8,649,910
1983	249,374.58	90,551.54	4,442,615	555,818	781,843	2,772,324	8,807,292

1 Statistics Canada (1985b).

2 Includes single homes (attached and detached) and multiple-unit dwellings; this is true both for vacant and occupied dwellings, and for all occupation categories.

3 Excluding cottages and mobile homes.

4 Derived from the sum of the four preceding columns plus the number of vacant dwellings (for sale and for rent).

APPENDIX C

Evaluation of 1978 imputed rents

	($ millions)		
Market value of dwellings	243,349		
Depreciation			2,290.5
Mortgage balance	55,578		
Interest paid			5,035.6
Insurance			502.7
Repairs, maintenance			2,232.5
Property taxes			2,624.6
Total expenses			12,685.9
Equity	187,772		
Net imputed rent			67.8
Gross imputed rent			12,753.7
Gross rate of return		5.2409%	
Net rate of return		0.0361%	

Source Depreciation: Statistics Canada, Building Permits Section, unpublished, excludes cottages.

Net imputed rent: Statistics Canada, The Input-Output Structure of the Canadian Economy, 1971-80, (Cat. 15-201E), Use Matrix, 1978.

All other variables: Statistics Canada. Family Expenditure Survey, 1978, public use tape.

Reference Sylvester Damus, table entitled "Imputation of Homeowner Rents into Family Income and Expenditures, 1978" from an untitled and unpublished paper.

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